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GUIDELINES FOR ACTION

STATE DOCUMENTS

BEARTOOTH

NOV 1 1971

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT MONTANA



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State of Montana
Office of The Governor
Helena 59601

June 15, 1970

FORREST H. ANDERSON
GOVERNOR

Mr. A. B. Linford
State Conservationist
Soil Conservation Service
P. O. Box 970
Bozeman, Montana 59715

Dear Mr. Linford:

I am pleased to endorse these Guidelines for Action in the Beartooth Resource Conservation and Development Project covering Carbon and Stillwater Counties in Montana. Favorable action on this plan will be a great stimulus to the area, state and nation.

I have been very favorably impressed with the planning effort of local citizens and the help from state and federal agencies in developing this comprehensive plan. I am thoroughly convinced of the desirable effect its implementation can have on the economy of the area. I have a tremendous interest in the wise use and development of Montana's resources and it gives me great pleasure to have a part in lending whatever support I can to help the sponsors achieve their objectives.

As Governor of Montana, I urge favorable consideration of the project plan and an early approval for operation.

Sincerely,

A handwritten signature in dark ink, reading "Forrest H. Anderson".

FORREST H. ANDERSON
Governor



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<http://archive.org/details/beartoothresourc27bear>

Witness the signatures of the undersigned sponsoring local organizations on the dates shown below:

CARBON SOIL & WATER CONSERVATION DISTRICT

By: J. D. Dehsten
Title: Chairman
Date: June 10, 1970

Authorized at an official meeting of the Carbon Soil & Water Conservation District on April 9, 1970, at Joliet, State of Montana

Attest: Paul Mykland
Secretary

STILLWATER SOIL & WATER CONSERVATION DISTRICT

By: Robert L. Strey
Title: Chairman
Date: June 10, 1970

Authorized at an official meeting of the Stillwater Soil & Water Conservation District on June 10, 1970, at Columbus, State of Montana

Attest: Robert W. Jones
Secretary

CARBON COUNTY

By: Arnell Fairbanker
Title: County Commissioner
Date: June 10, 1970

Authorized at an official meeting of the Carbon County Board of Commissioners on April 7, 1970, at Red Lodge, State of Montana

Attest: Frank Sawicki
Secretary

STILLWATER COUNTY

By: Wayne G. Eder
Title: Chm., Board of Commissioners
Date: June 10, 1970

Authorized at an official meeting of the Stillwater County Board of Commissioners on April 8, 1970, at Columbus, State of Montana

Attest: Thelma Shaw
Secretary

CITY of RED LODGE

By: Tom Olson
Title: Mayor
Date: June 10, 1970

Authorized at an official meeting of the Red Lodge City Council on April 9, 1968, at Red Lodge, State of Montana

Attest: Charles W. Mathis
Town Clerk

TOWN of COLUMBUS

By: A. C. Anderson

Title: Alderman

Date: June 10, 1970

Authorized at an official meeting of the Columbus Town Council on May 18, 1970, at Columbus, State of Montana

Attest: Olivia T. Berglund
Town Clerk

TOWN of BRIDGER

By: Harold Wright

Title: Mayor

Date: June 10, 1970

Authorized at an official meeting of the Bridger Town Council on May 5, 1970, at Bridger, State of Montana

Attest: Kathryn Furhouse
Town Clerk

TOWN of JOLIET

By: Jay D. Spaulding

Title: Mayor

Date: June 10, 1970

Authorized at an official meeting of the Joliet Town Council on April 13, 1970, at Joliet, State of Montana

Attest: Lillian Amundson
Town Clerk

TOWN of FROMBERG

By: James J. O'Connor

Title: Mayor

Date: June 10, 1970

Authorized at an official meeting of the Fromberg Town Council September 2, 1969, at Fromberg, State of Montana

Attest: Jay Roberts
Town Clerk

TOWN of BEARCREEK

By: Fay Guhlman

Title: Mayor

Date: June 10, 1970

Authorized at an official meeting of the Bearcreek Town Council on April 14, 1970, at Bearcreek, State of Montana

Attest: Ortha Maxwell
Town Clerk

INTRODUCTION

The Beartooth Resource Conservation and Development Project "Guidelines for Action" was prepared under authority of Public Law 87-703. Section 102 of the Food and Agricultural Act of 1962, Public Law 87-703, authorizes the Secretary of Agriculture "to cooperate with federal, state, territorial and other public agencies in developing plans for a program of land conservation and land utilization to assist in carrying out such plans - - -."

The Secretary of Agriculture, under Secretary's Memorandum No. 1515, defines Department objectives, states policy and principles in meeting its responsibilities under Section 102, P.L. 87-703, and assigns responsibilities to agencies of the Department.

Resource conservation and development projects are defined as a locally initiated and sponsored activity to expand the economic opportunities for the people of an area by developing and carrying out a plan of action for the orderly conservation, improvement, development and wise use of their natural resources.

The Beartooth RC&D Project Guidelines for Action is a functional framework plan for the sound conservation and use of the project area's soil, water and related resources. It is designed to complement and become an integral part of the area's comprehensive plan when such a plan is developed. Detailed plans and specifications will be developed through the medium of annual work plans in which project measure priorities are established by the sponsor's program committee.

An RC&D program is not a federal or state program. It is the local people's program -- a program sponsored, developed and carried out by local people with assistance from all agencies in local, state and federal government. It is a feasible, "open end," growing program.

"This program will be in compliance with all requirements reflecting non-discrimination as contained in the Civil Rights Act of 1964, and the regulations of the Secretary of Agriculture (7 CFR Sec. 15.1-15.13), which provides that no person in the United States shall on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activities receiving federal financial assistance."

ACKNOWLEDGMENTS

The materials and information in this report were obtained from many sources. The Beartooth RC&D Program Committee wish to express their appreciation and gratitude to all State and Federal agencies, and others who contributed to its development.

The ability and willingness of people to work together to formulate these Guidelines for Action was well expressed during the past year. No single agency or organization has the capability to solve the complex problems involved in a balanced program of total resource development for the people of this project area. We, as sponsors appreciate all the material, information and support received from the following agencies and organizations. We ask your continued support in this team effort to achieve our goals and objectives.

Agricultural Stabilization and Conservation Service (ASCS)
Bureau of Land Management (BLM)
Bureau of Reclamation (BR)
Bureau of Sports Fisheries and Wildlife Service (SF&WS)
Carbon County Development Council (CCDC)
Cooperative Extension Service (CES)
Economic Research Service (ERS)
Farmers Home Administration (FHA)
Forest Service (FS)
Health, Education and Welfare (HEW)
Housing and Urban Development (HUD)
Montana Association of Soil and Water Conservation Districts (MASWCD)
Montana Bureau of Mines and Geology (MBM&G)
Montana Fish and Game Commission (MF&G)
Montana State Experiment Station
Montana State University
Montana Statistical Reporting Service (MSRS)
Montana Water Resources Board (MWRB)
National Park Service (NPS)
Office of State Forester
Small Business Administration (SBA)
Soil Conservation Service (SCS)
State Soil and Water Conservation Committee (SSWCC)
State Department of Planning and Economic Development
State Highway Department
Stillwater County Development Organization (SCDO)
University of Montana
Weather Bureau (WB)

TABLE of CONTENTS

GOVERNOR's ENDORSEMENT

SPONSORS

INTRODUCTION

ACKNOWLEDGMENTS

SECTION I	OBJECTIVES	- - - - -	1
	SUMMARY	- - - - -	3

RESOURCE MAPS

1. Location Map
2. Precipitation Map
3. Topography Map
4. Geology Map
5. Minerals Map
6. Soils Map
7. Land Ownership Map
8. Land Use Map
9. Recreation Map

SECTION II DESCRIPTION of PROJECT AREA

A.	Location and Size	- - - - -	6
B.	Physical Features	- - - - -	6
	Climate	- - - - -	6
	Topography and Drainage	- - - - -	8
	Geology	- - - - -	9
	Minerals	- - - - -	10
	Soils	- - - - -	12
	Interpretive Soils Table I	- - - - -	26
	Land Ownership	- - - - -	28
	Land Use	- - - - -	28
	Plant Resources	- - - - -	29
	a. Irrigated Land	- - - - -	29
	b. Non-irrigated Cropland	- - - - -	29
	c. Range and Pasture Land	- - - - -	29
	d. Forest and Woodlands	- - - - -	30
	Water Resources	- - - - -	34
	a. Surface Water	- - - - -	34
	Stream Gage Data - Table 2	- - - - -	36
	b. Ground Water	- - - - -	37
	c. Feasible Watersheds	- - - - -	38
	Wildlife	- - - - -	39
	Recreation	- - - - -	41
C.	Economic and Social Data	- - - - -	43
	Agriculture and Related Uses	- - - - -	43
	Farm Product Sales - Table 3	- - - - -	44
	Livestock Numbers - Table 4	- - - - -	44

Land Use - Acres - Table 5	- - - -	44
Acreage by Land Capability-Table 6	- - - -	45
Average Yield (Cropland) - Table 7	- - - -	46
Cost & Return (Range) - Table 8	- - - -	46
Farm Size - Tenure - - - - -	- - - -	47
Economic Class - Table 9	- - - -	48
Market Accessibility & Transportation	- - - -	49
Public Facilities - - - - -	- - - -	49
Population - - - - -	- - - -	50
Employment - - - - -	- - - -	51
Employment Change - Carbon - Table 10	- - - -	51
Employment Change-Stillwater-Table 11	- - - -	52
Industry - - - - -	- - - -	52
Labor Force - - - - -	- - - -	53
Income		
Social & Economic - Table 14	- - - -	54
Pollution - - - - -	- - - -	54

SECTION III	PROBLEMS and OPPORTUNITIES	
A. Cropland - - - - -	- - - -	56
B. Water Resources - - - - -	- - - -	60
C. Range and Pasture Resources - - - - -	- - - -	62
D. Woodland Resources - - - - -	- - - -	64
E. Mineral Resources - - - - -	- - - -	67
F. Wildlife Resources - - - - -	- - - -	71
G. Recreation Resources - - - - -	- - - -	74
H. Human & Economic Resources - - - - -	- - - -	77

SECTION IV	PROJECT MEASURES - - - - -	80
A. Acceleration of Going Programs - - - - -	- - - -	81
1. Soil Surveys - - - - -	- - - -	81
2. Conservation Planning - - - - -	- - - -	81
3. Land Treatment - - - - -	- - - -	82
a. Private Non-forest - - - - -	- - - -	82
b. Private Forest - - - - -	- - - -	83
c. Federal Lands - - - - -	- - - -	84
4. ACP - Cost Sharing - - - - -	- - - -	86
5. Credit Needs - - - - -	- - - -	86
B. Structural Measures - - - - -	- - - -	87
C. Associated Measures - - - - -	- - - -	92
D. Supporting Measures - - - - -	- - - -	93

SECTION V	ECONOMIC IMPACT - - - - -	95
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SECTION VI and VII		
Project Installation & Operation-Maintenance	- - - -	97

OBJECTIVES and SUMMARY



BEARTOOTH RC&D PROJECT PROGRAM COMMITTEE

representing the

SPONSORING ORGANIZATIONS
(left to right)

Verne Fairbanks -- Carbon County
David Matovich -- Stillwater County
Mrs. Fay Kuhlman -- Town of Bearcreek
Chm. Fred Weiler -- Stillwater Soil & Water Conservation District
V. Chm. William Skorupa -- Carbon Soil & Water Conservation District
Mrs. Betty Anderson -- Carbon County Development Council
Warren Toogood -- Town of Columbus
W. E. White -- Stillwater County Development Organization

Inactive since 1963,
the RC&D application
for planning assist-
ance was reactivated
November 2, 1967 at
a county-wide meet-
ing of community
leaders.



Regular monthly meet-
ings of the Program
Committee alternate
between Carbon and
Stillwater counties.

SECTION I

OBJECTIVES for BEARTOOTH RC&D PROJECT

The following major objectives were agreed on by the sponsor, program committee and development groups of the Beartooth RC&D Project. Leadership to develop and carry out these objectives will come from the program committee with support of people in the Beartooth project area. The sponsors and program committee will direct the program for orderly development of the area's resources. Their accomplishment will meet the needs and desires of the people and make this area a better place for people to live, work and play.

The objectives are to:

1. Plan, develop and protect the natural resources of the area to meet the needs of people and permit the highest social and economic return to the community, state and nation without undue waste or pollution.
2. Develop the human resources of the project area by reversing the outgoing population trend and provide job opportunities through the development of all resources. The sponsors want to provide a favorable climate for industrial and recreational development that is compatible with other resources of the area and will add to the economic growth.
3. Increase farm and ranch income by accelerated application of well planned conservation practices to protect production capability of resources and provide alternatives. A need exists to develop operation and marketing skills in farm related industrial enterprises.
4. Provide opportunities to adjust the size of farm units to increase family income and reduce the number of families living at poverty levels.
5. Provide technical and financial assistance to better utilize water resources for domestic, agriculture, recreation and industrial uses. To encourage the development and use of sprinkler irrigation, consolidation of irrigation canal systems and lining of irrigation canals. Use of the small watershed program on potential watersheds will be promoted. Multipurpose use will be emphasized in development of reservoir sites. We will work for reduction and elimination of pollution that affects the water quality in streams, lakes and underground water sources.
6. Improve recreational opportunities and increase tourism in the area. Provide income-producing recreation compatible with local interests

6 - continued

- and needs. Develop existing attractions to bring visitors to the area. Provide attractive accommodations for the tourist and sportsman. Improve access to recreational and historical sites.
7. Provide improved educational facilities and a wholesome social environment for our young people. Economic data show people are leaving because employment opportunities are limited. We will encourage and assist new industry to locate in the area. Job opportunities will provide an incentive to keep our youth in the area. They are our future leaders.
 8. Develop mineral resources without destroying other resources. Careless exploration activities have defaced the land, created gullies and polluted streams. We will work for an active mineral industry consistent with conservation of all available resources.
 9. Develop our timber resources and marketing facilities under a program that will provide multiple use benefits. Certain woodlands have a greater value for wilderness and recreation uses than for timber production. These uses will be encouraged where feasible.
 10. Increase the living accommodations in the area. Small communities have few rental units and these are generally old and unattractive. We will explore all methods to provide additional housing.
 11. Promote cooperation and reduce frictions to keep communities working together. Diverse problems and extremes in geography have created difficulties in coordination of ideas leading to programs for the good of people. We will seek a common meeting ground with facilities that will create a cooperative climate where people can work together to accelerate progress needed to improve their environment.
 12. Complete a detailed soil survey of Stillwater County portion of the Beartooth area.
 13. Accelerate measures to reduce pollution of air, water and soil while seeking ways to improve and beautify our environmental resources.
 14. Develop water, sewer and solid waste disposal systems for small communities.
 15. Improve education, health and welfare facilities for people in the project area.
 16. Encourage early completion of the Type IV River Basin study for the Wind-Bighorn-Clarks Fork drainages in Montana and Wyoming.

SUMMARY - BEARTOOTH GUIDELINES FOR ACTION

The Beartooth Resource Conservation and Development Plan for Action was sponsored by the following legal subdivisions of local government:

1. Carbon Soil & Water Conservation District
2. Stillwater Soil & Water Conservation District
3. Carbon County Commissioners
4. Stillwater County Commissioners
5. Town of Red Lodge, county seat of Carbon County
6. Town of Bridger, Carbon County
7. Town of Joliet, Carbon County
8. Town of Fromberg, Carbon County
9. Town of Bearcreek, Carbon County
10. Town of Columbus, county seat of Stillwater County

The program committee includes the chairman of the Carbon County Development Council and the Stillwater County Development Organization.

The sponsors and members of the program committee present these Guidelines for Action to the people of the project area for their support in the orderly development of all resources of this two-county area. The objectives, ideas, and proposals presented in this plan were drawn from public meetings in which more than 1,000 people expressed their views in relation to solving problems that would contribute to the social and economic growth of the area. Advice and counsel have been received from many service organizations as well as county, state, and federal agencies.

County development groups, with guidance from the Montana Cooperative Extension Service, have been active for several years. Resource committees within these groups have engaged in the orderly review of many special project needs of local people. Coordinated effort and federal assistance are needed to implement many of these proposals for better economic growth and development in the project area.

The Beartooth Resource Conservation and Development Project contains 2,474,880 acres of land of which 31 percent is federally owned. There are seventeen communities in the project area and Red Lodge is the largest town with a population of 2,230. (1960 census). Nearly 16 percent of total population of both counties live in Red Lodge.

Agriculture. Opportunities to improve the agricultural resources of the area and increase economic benefits are numerous. Improved irrigation systems and water management are needed on 94 percent of the irrigated acreage. Only 45 percent of the dry cropland is adequately treated. Grass resources can be improved on 60 percent of the native range and 85 percent of the tame pasture. Sixty five percent of the commercial woodland on private and state owned lands can be improved.

The agricultural resource problems listed represent a challenge to land owners and operators to carry out well planned conservation practices that will lead to better utilization of the soil and water resources. Acceleration of going programs and the continued participation by state and federal agencies offering technical and financial assistance is necessary to achieve needed benefits from proper land use.

Water. Development and beneficial use of water is considered very important to the economic future and well being of the people in the Beartooth area. Demand for water already exceeds the supply in late summer. Project measures are needed to achieve better efficiency of irrigation water, flood control, water storage, sediment reduction, pollution abatement and improve recreational benefits to the area. Municipal and industrial needs must be considered to assure optimum benefits and proper use of the water resource. Type IV River Basin studies will identify feasible projects that will improve the economic and social benefits of the area.

Minerals. The project area has a wide variety of mineral resources, many of which are undeveloped. Coal, gas, oil, gypsum, bentonite, sandstone and clay have all been mined in the area and locally show considerable promise for future development. Carbon County ranks second in the state in mineral wealth and mining interest continues to increase. Coal deposits in the Red Lodge field are of high quality and were mined extensively until 1943.

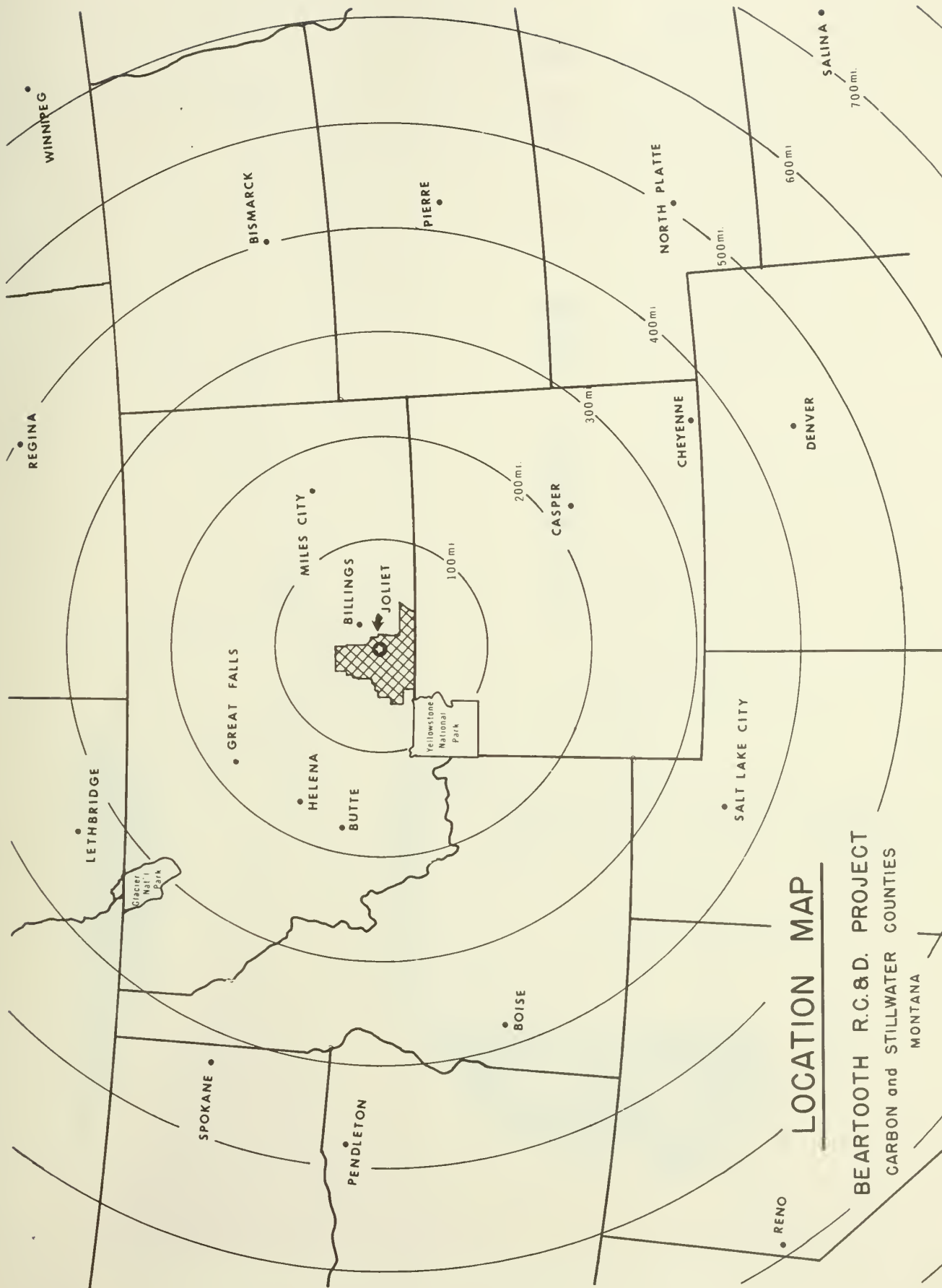
Human Resources. Social and economic growth of small towns, disadvantaged by lack of employment opportunities, will be improved through project measures. These would provide vocational training and retraining programs to develop occupational skills and increase employment in resource based activities. Job opportunities have declined severely and resulted in out-migration and a reduction of businesses needed to support the people. Several communities must improve their sewage and waste disposal systems to meet health standards and reduce pollution. Relieving these problems will require cooperation, knowledge, understanding and financial aid. People can solve these problems with active participation and needed technical assistance.

Recreation and Wildlife. Recreation potential in the Beartooth area is essentially untapped except for localized areas. Growth and development of the recreation and wildlife resource has been hindered by lack of planning and financial investment. The Beartooth project area is rich in scenic beauty and geologic formations. The Pryor Mountains hold a vast storehouse of treasures for the spelunker and seeker of Indian lore. There is an exciting history in the early settlement of the area centered around Captain Lewis' and Clark's travels and events that followed. To achieve the goals and opportunities from these resources they must be planned and developed with other interrelated uses of land and water. Tourism is increasing and good facilities are needed to provide the tourist with desirable accommodations.

Overall Economic Impact. The economic impact from project activities and proposed developments during the life of the project will have marked benefits to all residents of the area.

It is estimated that during the first three years of operation that employment opportunities will be increased by 515 man-years and the economic impact within the project will be \$25,763,100. During the 4 to 8 year period employment will be increased 1431 man-years and the expected economic impact will be \$42,738,500. In the 9 to 20 year period employment will increase 4122 man-years and the economic impact will be \$71,754,000.

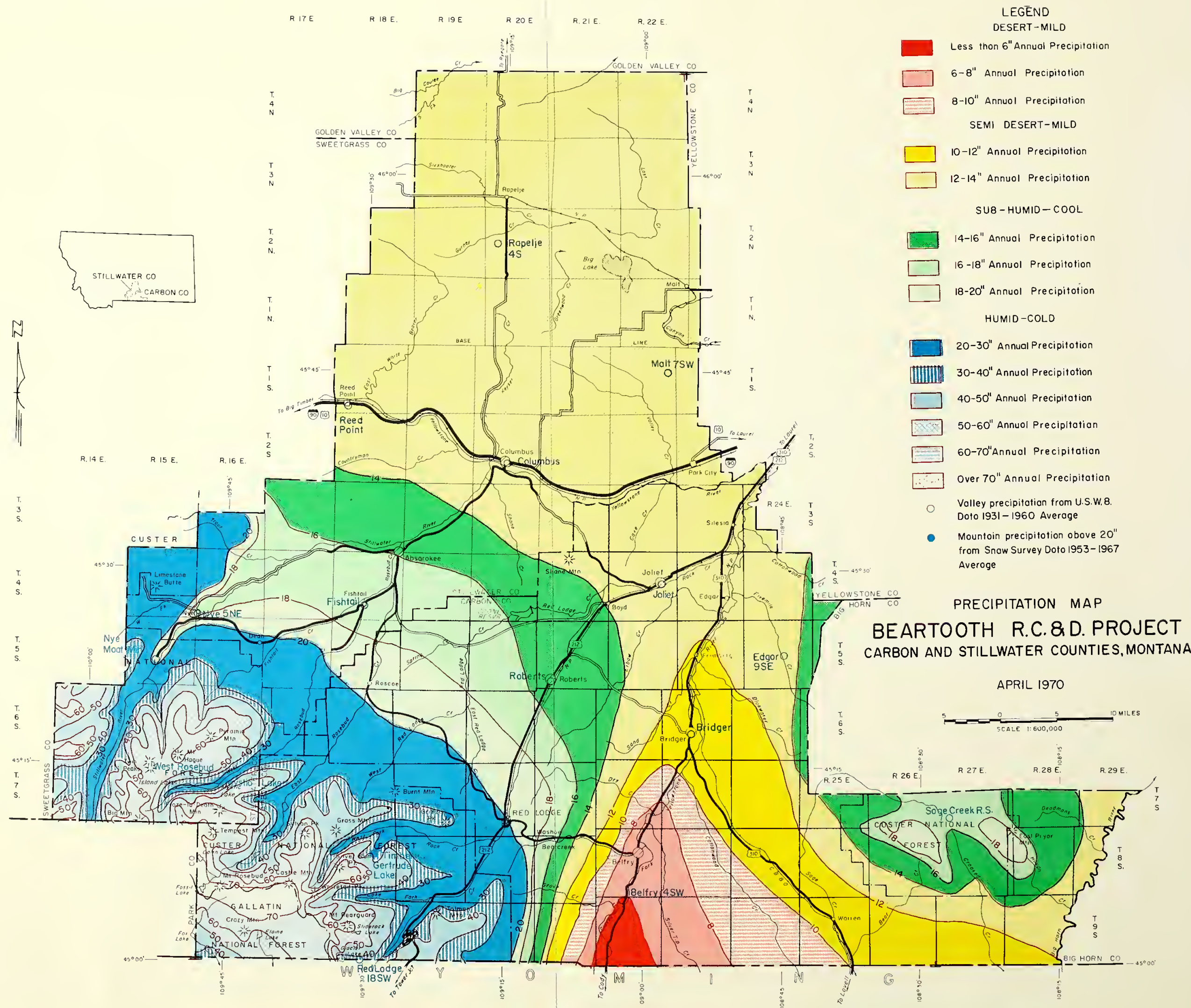
In addition to the many economic benefits gained through the development of project measures there will be a tremendous improvement on the environmental quality through the preservation of the natural beauty.

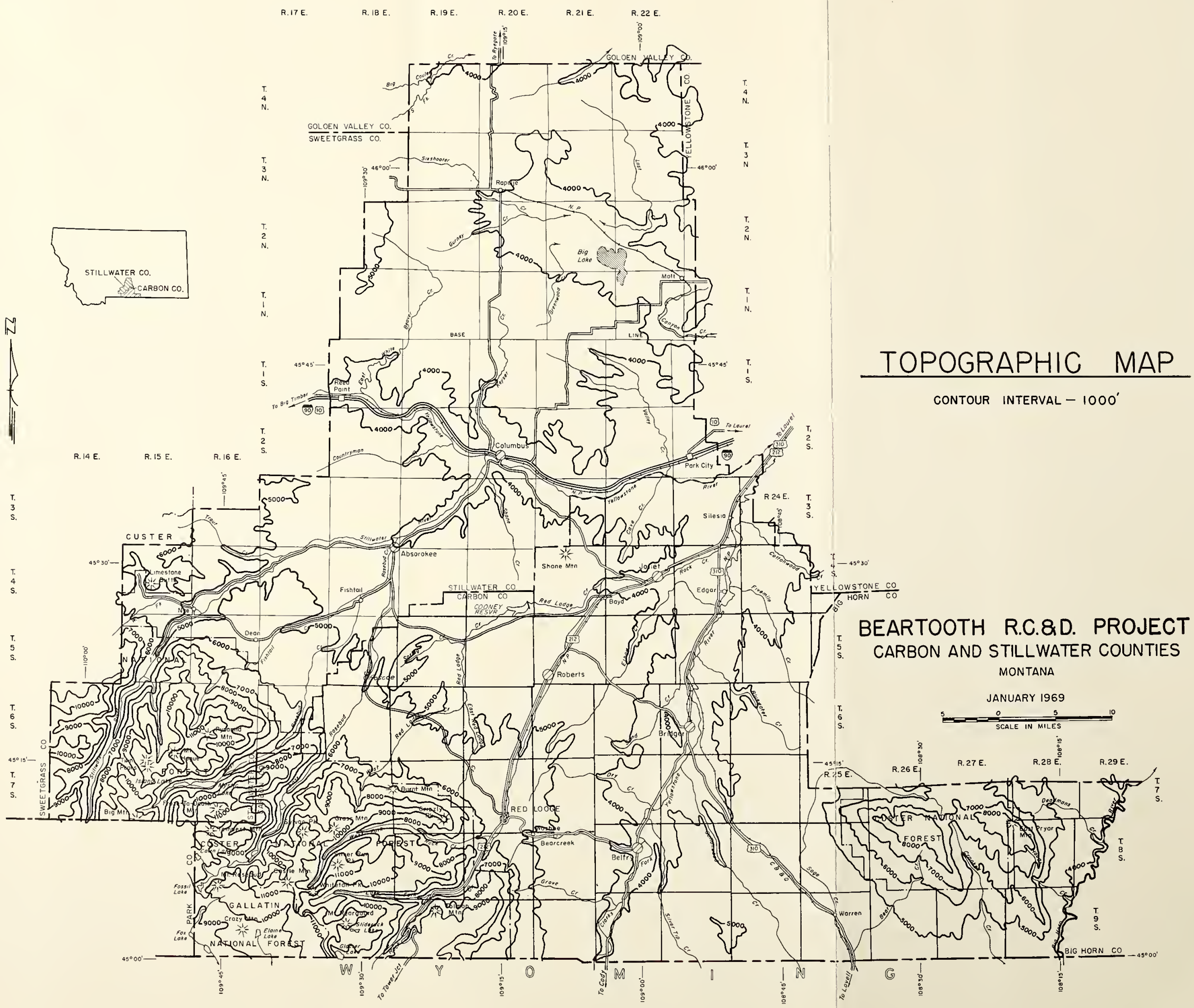


LOCATION MAP

BEARTOOTH R.C.&D. PROJECT
CARBON and STILLWATER COUNTIES
MONTANA







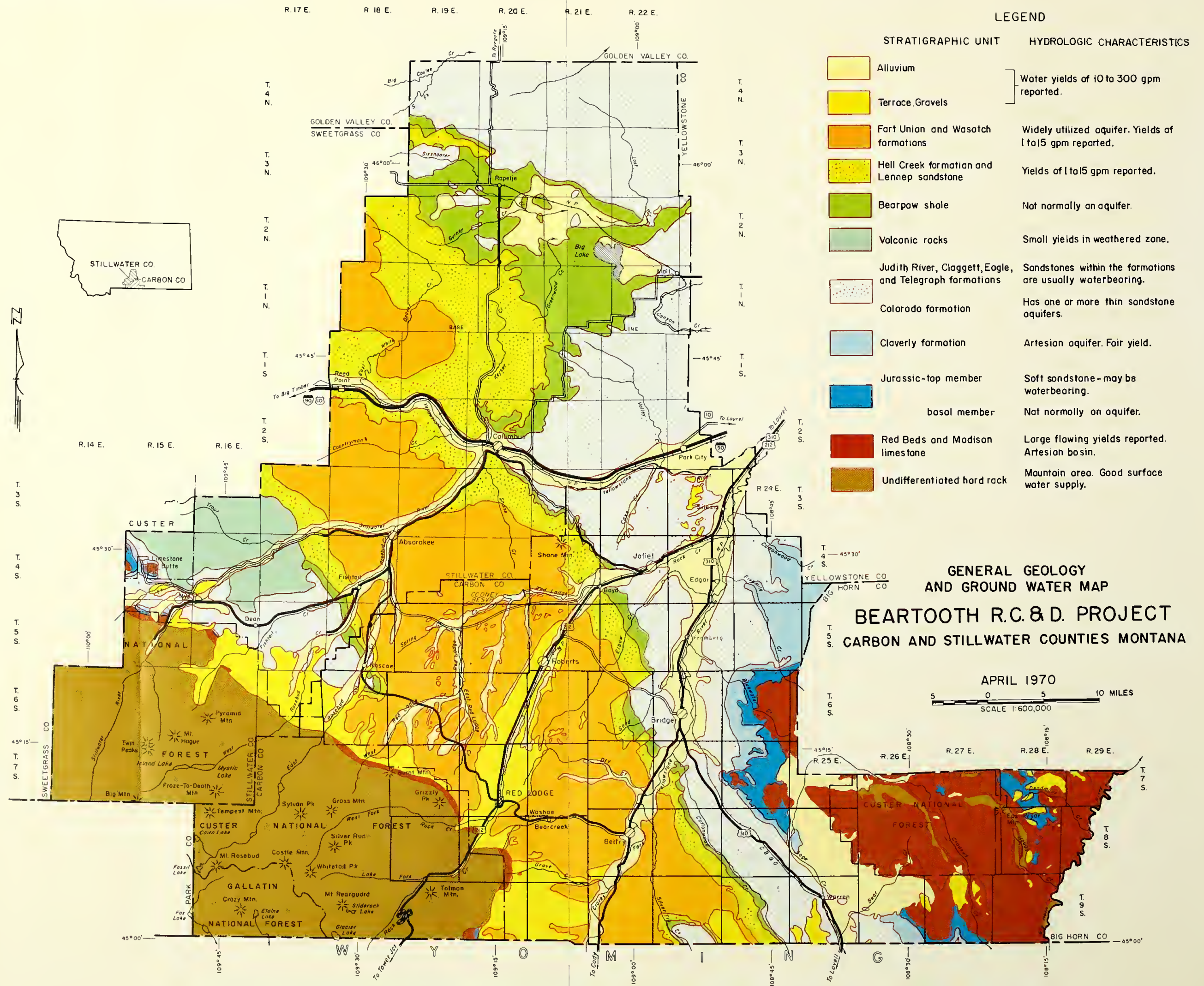
TOPOGRAPHIC MAP

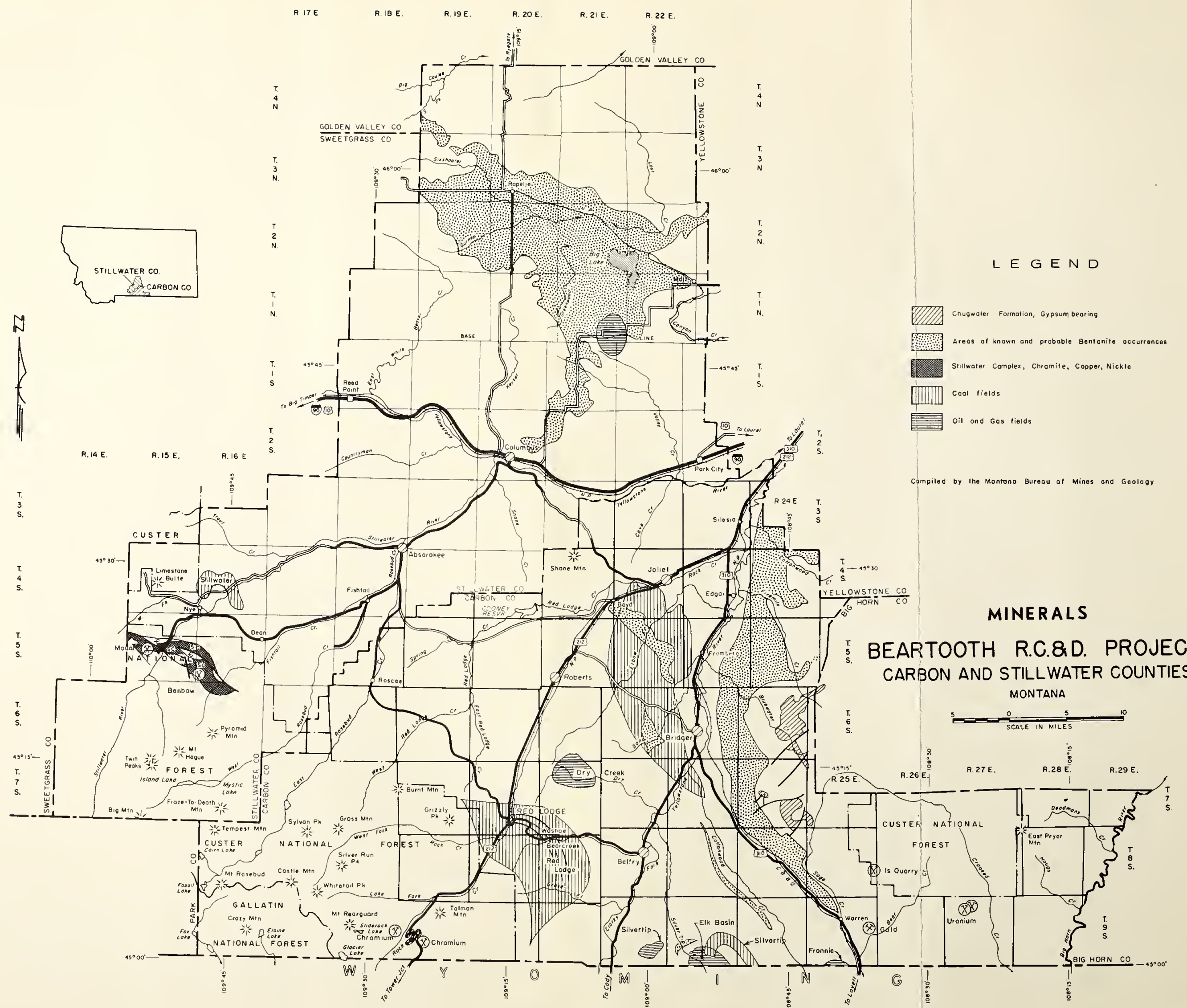
CONTOUR INTERVAL - 1000'

BEARTOOTH R.C.&D. PROJECT
CARBON AND STILLWATER COUNTIES
MONTANA

JANUARY 1969

SCALE IN MILES
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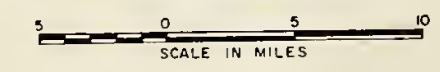


LEGEND

- Chugwater Formation, Gypsum bearing
- Areas of known and probable Bentonite occurrences
- Stillwater Complex, Chromite, Copper, Nickel
- Coal fields
- Oil and Gas fields

Compiled by the Montana Bureau of Mines and Geology

MINERALS
BEARTOOTH R.C.&D. PROJECT
CARBON AND STILLWATER COUNTIES
MONTANA



R. 17 E. R. 18 E. R. 19 E. R. 20 E. R. 21 E. R. 22 E.

LEGEND

DEEP, LOAMY, WELL DRAINED SOILS OF THE FLOOD PLAINS AND NARROW VALLEYS

- 1 Haverson-Glenberg association: Dominated by well drained, light colored, loam and sandy loam soils and alkali loam soils on valley bottoms in warm arid regions.
- 2 Heldt association: Dominated by well drained, light colored, clay loam soils and light colored, very gravelly, high lime soils in valleys on alluvial fans and terraces in warm arid regions.
- 3 Maurice*-Pryor*-Dukon* association: Dominated by well drained and poorly drained, dark colored, loam soils and well drained, light colored, sandy loam soils in cold subhumid regions.
- 4 Shorey*-Stormitt*-Garvin* association: Dominated by well drained, light colored, clay loam soils and light colored, very gravelly, high lime soils and shallow, reddish loam soils on alluvial fans, terraces, and rough steep uplands in warm arid regions.
- 5 Havre-Redpoint* association: Dominated by well drained, light colored, clay loam soils and loam soils on valley bottoms and coalescing alluvial fans in cool semiarid regions.

DEEP, MODERATELY DEEP AND SHALLOW, CLAYEY SOILS OF THE SHALE AND SANDSTONE UPLANDS

- 6 Midway-Travessilla-Lisnas association: Dominated by shallow, excessively drained, light colored, clay soils on shale, and sandy loam on sandstone on rolling to steep uplands in warm arid regions.
- 7 Yawdim*-Cappa-Rentsac* association: Dominated by shallow, excessively drained, light colored, clay soils on shale, and loam soils on shale and sandstone, on rolling to steep uplands in cool semiarid regions.
- 8 Nunn-Wormser association: Dominated by well drained, light colored, loam and clay loam soils with clay subsoils, and shallow loam soils on sandstone uplands in warm semiarid regions.
- 9 Absarokee-Haginnis association: Dominated by well drained, dark colored, clay loam soils and light colored, moderately deep soils over sandstone on broad ridge tops and steep sloping uplands in cool subhumid regions.
- 10 Pierre-Lisnas-Kyle association: Dominated by well drained, light colored, clay soils on steep and hilly shale bedrock upland, in warm arid regions.
- 11 Berry*-Fiddler* association: Dominated by well drained, dark colored, clay loam soils and moderately deep and shallow soils over shale and sandstone bedrock in cool semihumid regions.
- 12 Midway association: Dominated by shallow, excessively drained, light colored, clay soils on shale and sandy loam soils on sandstone upland bedrock plains in warm arid regions.
- 13 Wormser-Lavina* association: Dominated by well drained, light colored, clay loam and loam soils with clay subsoils and shallow loam soils on sandstone uplands in warm semiarid regions.

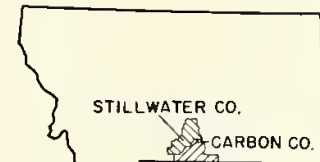
DEEP AND MODERATELY DEEP LOAMY SOILS OF THE OUTWASH TERRACES AND FANS

- 14 Belfry*-Charles-Sayne* association: Dominated by well drained, dark colored, loam soils and sandy soils on steep uplands and mountainous foothills in cold subhumid regions.
- 15 Romberg*-Loma* association: Dominated by well drained, light colored, very gravelly and stony loam soils with very gravelly substratum on glaciated terraces in warm arid regions.

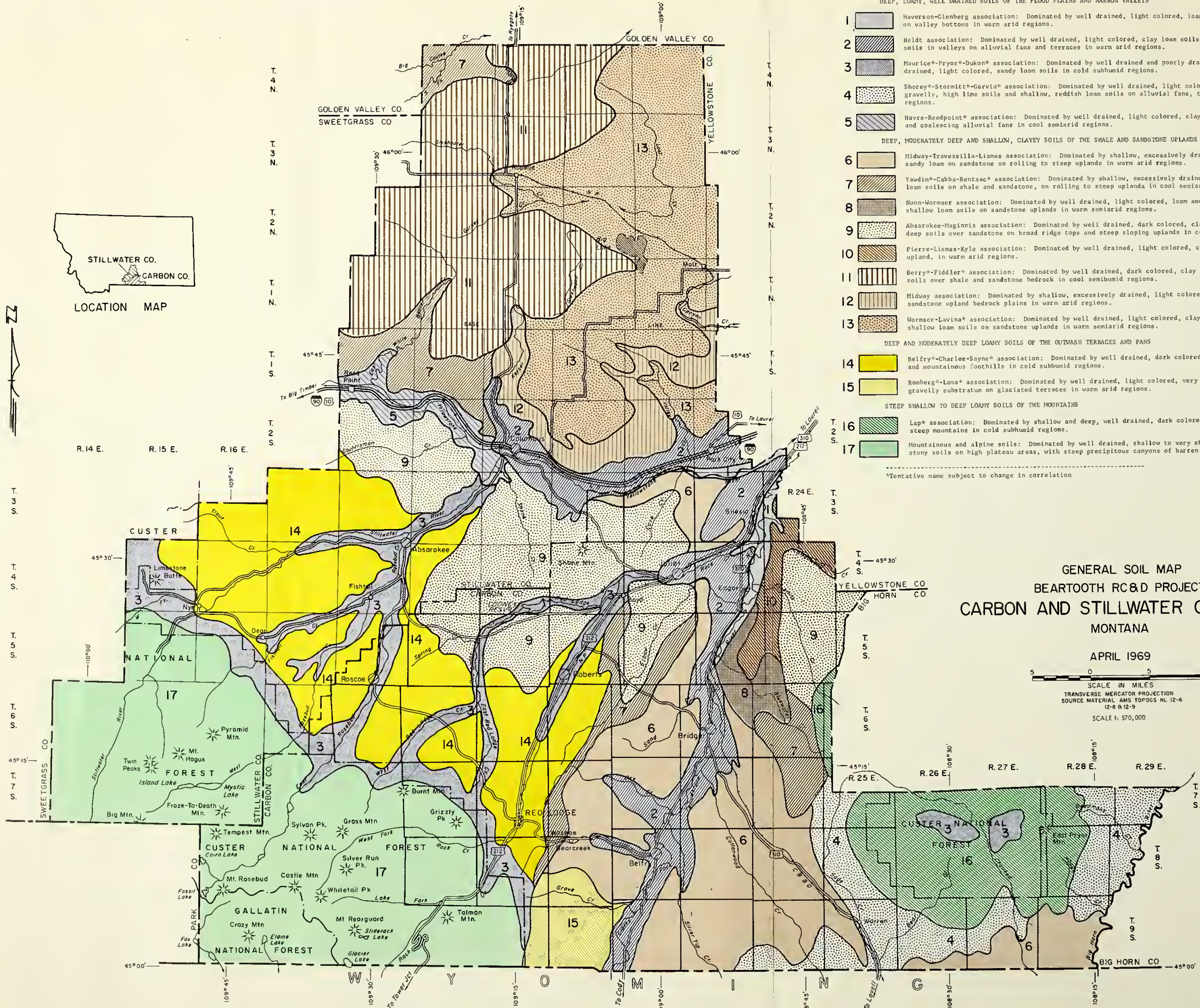
STEEP SHALLOW TO DEEP LOAMY SOILS OF THE MOUNTAINS

- 16 Lap* association: Dominated by shallow and deep, well drained, dark colored, loam soils over limestone on sloping and steep mountains in cold subhumid regions.
- 17 Mountainous and alpine soils: Dominated by well drained, shallow to very shallow, dark colored, nonlimy, gravelly and stony soils on high plateau areas, with steep precipitous canyons of barren rock. The area is cold and humid.

*Tentative name subject to change in correlation



LOCATION MAP



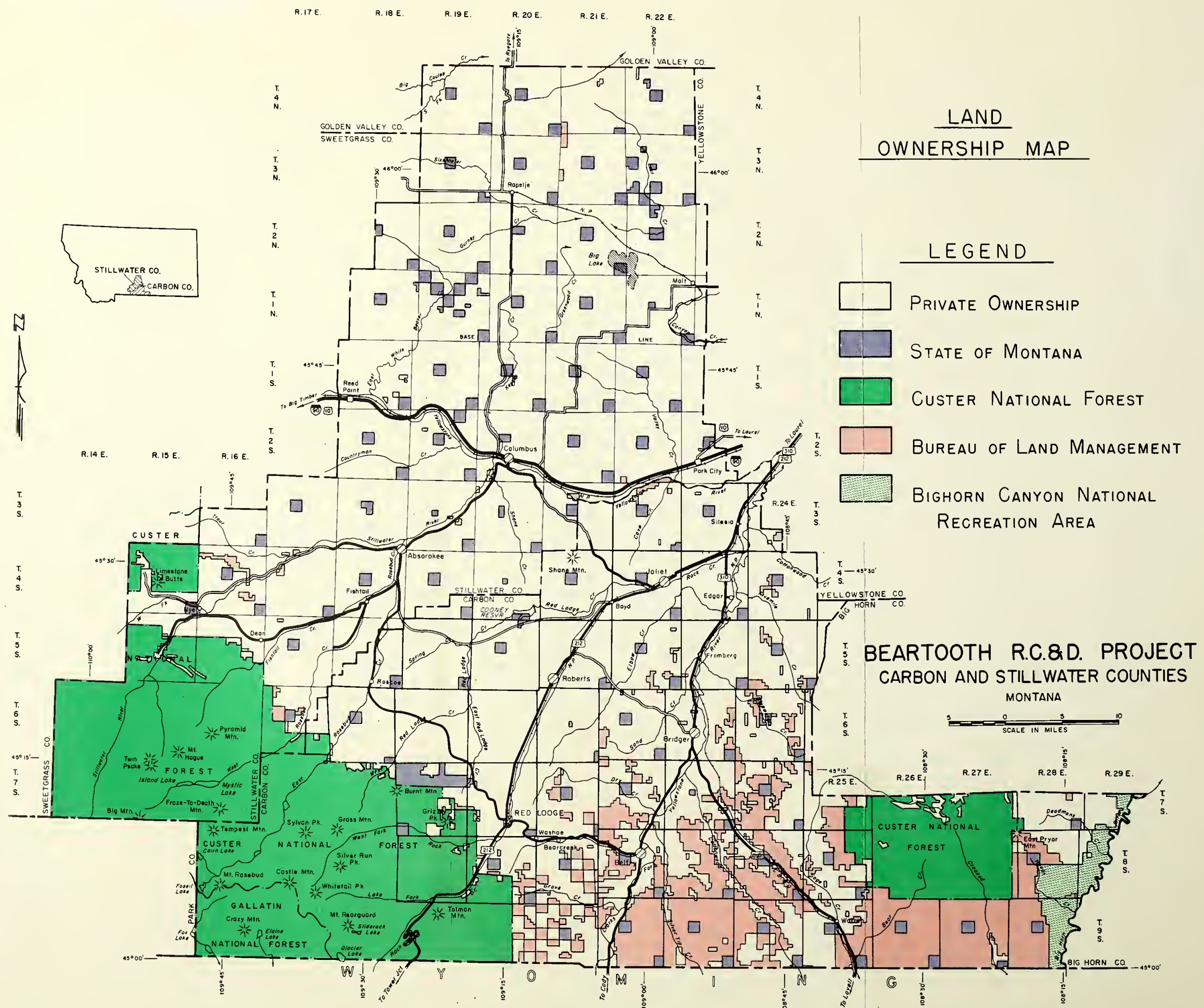
GENERAL SOIL MAP BEARTOOTH RC&D PROJECT CARBON AND STILLWATER COUNTIES MONTANA

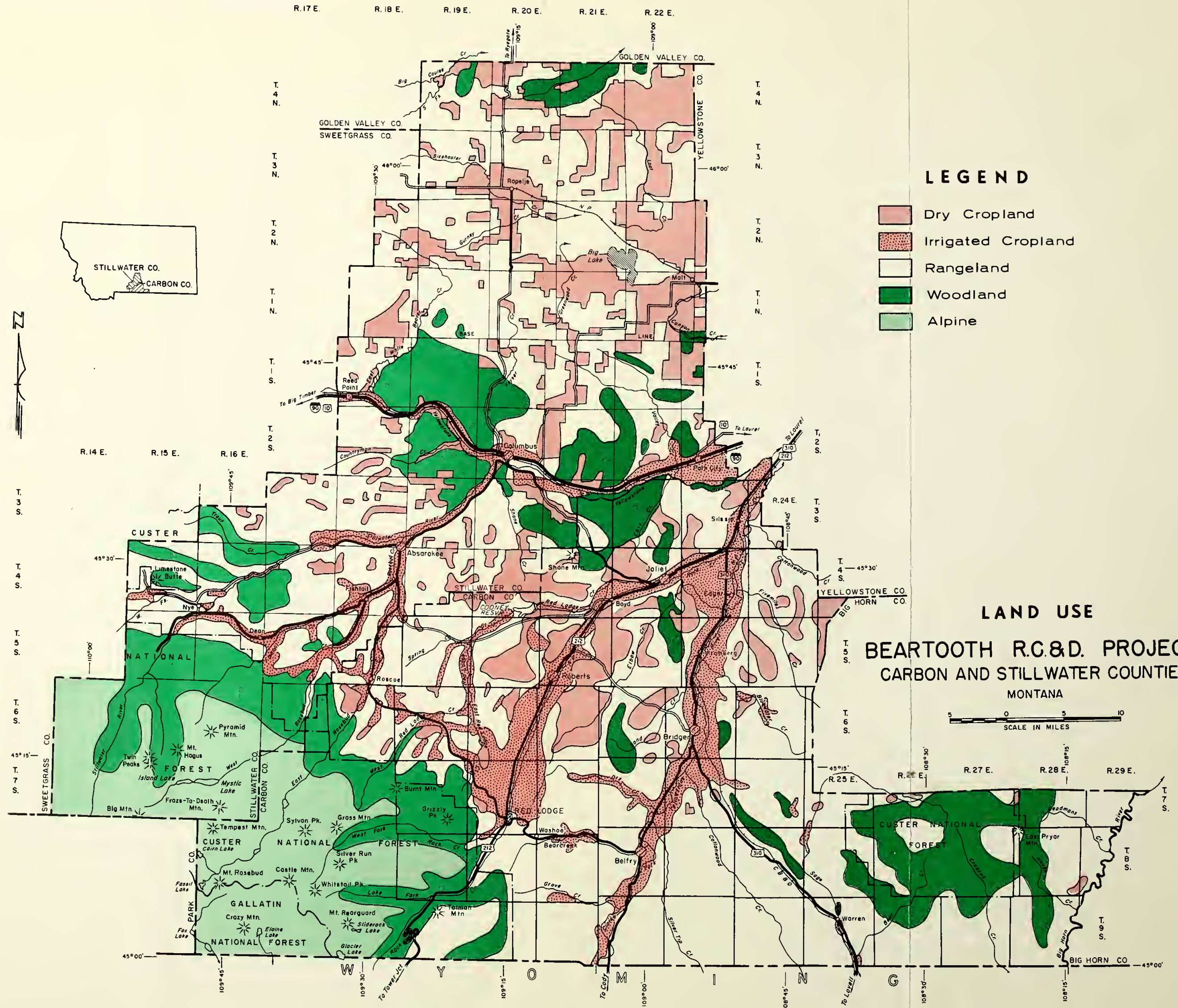
APRIL 1969

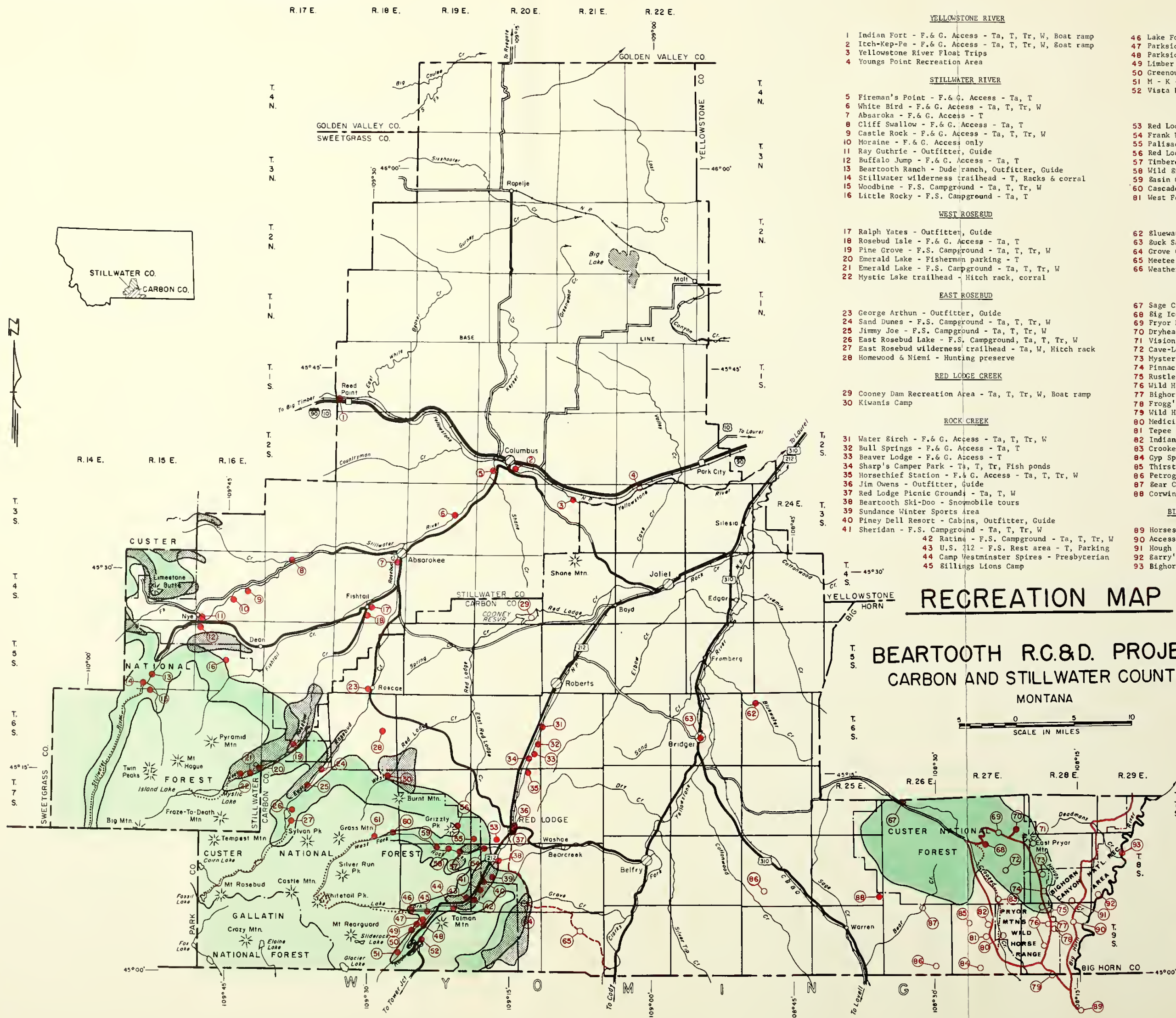
SCALE IN MILES

TRANSVERSE MERCATOR PROJECTION
SOURCE MATERIAL: AMS TOPOGS NL 12-6
12-8 & 12-9

SCALE 1: 570,000







YELLOWSTONE RIVER

- 1 Indian Fort - F. & G. Access - Ta, T, Tr, W, Boat ramp
- 2 Itch-Kep-Pe - F. & G. Access - Ta, T, Tr, W, Boat ramp
- 3 Yellowstone River Float Trips
- 4 Youngs Point Recreation Area

STILLWATER RIVER

- 5 Fireman's Point - F. & G. Access - Ta, T
- 6 White Bird - F. & G. Access - Ta, T, Tr, W
- 7 Absaroka - F. & G. Access - Ta
- 8 Cliff Swallow - F. & G. Access - Ta, T
- 9 Castle Rock - F. & G. Access - Ta, T, Tr, W
- 10 Moraine - F. & G. Access only
- 11 Ray Guthrie - Outfitter, Guide
- 12 Buffalo Jump - F. & G. Access - Ta, T
- 13 Beartooth Ranch - Dude ranch, Outfitter, Guide
- 14 Stillwater wilderness trailhead - T, Racks & corral
- 15 Woodbine - F.S. Campground - Ta, T, Tr, W
- 16 Little Rocky - F.S. Campground - Ta, T

WEST ROSEBUD

- 17 Ralph Yates - Outfitter, Guide
- 18 Rosebud Isle - F. & G. Access - Ta, T
- 19 Pine Grove - F.S. Campground - Ta, T, Tr, W
- 20 Emerald Lake - Fisherman parking - T
- 21 Emerald Lake - F.S. Campground - Ta, T, Tr, W
- 22 Mystic Lake trailhead - Hitch rack, corral

EAST ROSEBUD

- 23 George Arthun - Outfitter, Guide
- 24 Sand Dunes - F.S. Campground - Ta, T, Tr, W
- 25 Jimmy Joe - F.S. Campground - Ta, T, Tr, W
- 26 East Rosebud Lake - F.S. Campground - Ta, T, Tr, W
- 27 East Rosebud wilderness trailhead - Ta, W, Hitch rack
- 28 Homewood & Niemi - Hunting preserve

RED LODGE CREEK

- 29 Cooney Dam Recreation Area - Ta, T, Tr, W, Boat ramp
- 30 Kiwanis Camp

ROCK CREEK

- 31 Water Birch - F. & G. Access - Ta, T, Tr, W
- 32 Bull Springs - F. & G. Access - Ta, T
- 33 Beaver Lodge - F. & G. Access - T
- 34 Sharp's Camper Park - Ta, T, Tr, Fish ponds
- 35 Horsethief Station - F. & G. Access - Ta, T, Tr, W
- 36 Jim Owens - Outfitter, Guide
- 37 Red Lodge Picnic Ground - Ta, T, W
- 38 Beartooth Ski-Doo - Snowmobile tours
- 39 Sundance Winter Sports Area
- 40 Piney Dell Resort - Cabins, Outfitter, Guide
- 41 Sheridan - F.S. Campground - Ta, T, Tr, W
- 42 Ratine - F.S. Campground - Ta, T, Tr, W
- 43 U.S. 212 - F.S. Rest area - T, Parking
- 44 Camp Westminster Spires - Presbyterian
- 45 Billings Lions Camp

ROCK CREEK (cont'd)

- 46 Lake Fork wilderness trailhead - T, Racks & corral
- 47 Parkside Picnic Area - Ta, T
- 48 Parkside - F.S. Campground - Ta, T, Tr, W
- 49 Limber Pine - F.S. Campground - Ta, T, Tr
- 50 Greenough - F.S. Campground - Ta, T, Tr, W
- 51 M - K - F.S. Campground - Ta, T, Tr
- 52 Vista Point - T, Snowmobile takeoff point

WEST FORK OF ROCK CREEK

- 53 Red Lodge Elks Golf Course - 9 hole
- 54 Frank Ward - private fishing ponds
- 55 Palisades - F.S. Campground - Ta, T, Tr, W
- 56 Red Lodge Mountain Ski Area
- 57 Timbercrest Girl Scout Camp
- 58 Wild Mills Lake - Fisherman parking - T, Ta
- 59 Gasin Creek - F.S. Campground - Ta, T, Tr, W
- 60 Cascade - F.S. Campground - Ta, T, Tr, W
- 61 West Fork wilderness trailhead - T, Racks & corral

CLARKS FORK

- 62 Bluewater - F. & G. Access - Ta, T
- 63 Buck Sanford - Outfitter, Guide
- 64 Grove Creek Recreation Area - Ta, T
- 65 Meeteetsee Historic Trail
- 66 Weatherman Indian Painting Site - parking, trails

PRYOR MOUNTAIN

- 67 Sage Creek - F.S. Campground - Ta, T, Tr, W
- 68 Big Ice Cave & picnic area - Ta, T
- 69 Pryor Mountain Loop Road & snowmobiling
- 70 Dryhead Overlook - T, parking
- 71 Vision Quest Overlook - Ta, parking
- 72 Cave-Lost Water Canyon roughing and natural area
- 73 Mystery Cave - Ta, T, W
- 74 Pinnacle Overlook - parking
- 75 Rustlers Overlook - parking
- 76 Wild Horse Observation Points - parking
- 77 Bighorn Canyon Overlook - parking
- 78 Frogg's Fault Cave - parking
- 79 Wild Horse Visitor Center - Ta, T, W
- 80 Medicine Man Petroglyph Site - trail access
- 81 Teepee Ring Viewpoint - parking
- 82 Indian Village Encampment - parking, trails
- 83 Crooked Creek Canyon Trail
- 84 Gyp Springs Archeological Site - parking
- 85 Thirsty Bird Archeological Site - parking, trails
- 86 Petroglyph Recreation Site - Ta, T, W
- 87 Bear Canyon - S.L.M. Campground, Ta, T, Tr
- 88 Corwin Rule - Outfitter, Guide

BIGHORN CANYON NATIONAL RECREATION AREA

- 89 Horseshoe Bend Recreation & Boating Development
- 90 Access Road - paved
- 91 Hough Creek Recreation Development
- 92 Gary's Landing Recreation & Boating Development
- 93 Bighorn Lake

GENERAL

Snowmobiling permitted on roads and trails closed to wheeled vehicles.

Detailed recreation information available from:

U.S. Forest Service
Red Lodge 59068
Bureau of Land Management
Billings 59103
Montana Fish & Game Department
Billings 59101
Bighorn Canyon Nat'l. Rec. Area
Hardin 59035
Beartooth R.C.&D. Project
Joliet 59041

MAP SYMBOLS

- - Existing Development
- - Planned Development

- Ta - Tables
- T - Toilets
- Tr - Trailers
- W - Water

Snow for skiing and snowmobiling - late November to late May.

Snow for snowmobiling - late December to late March.

Critical big game winter range.

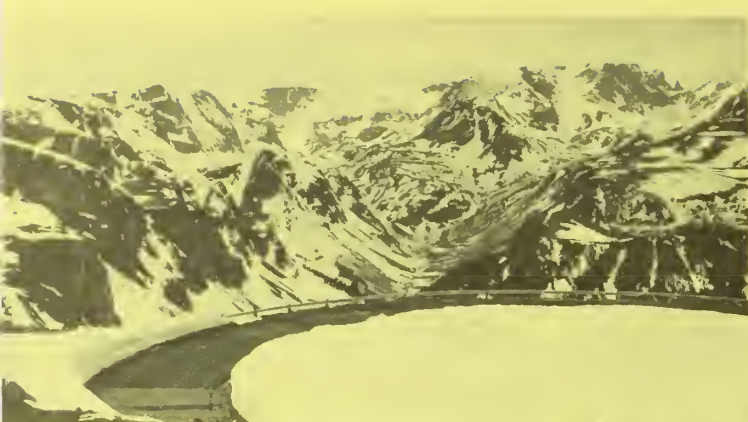
RECREATION MAP

BEARTOOTH R.C.&D. PROJECT CARBON AND STILLWATER COUNTIES MONTANA

SCALE IN MILES
0 5 10

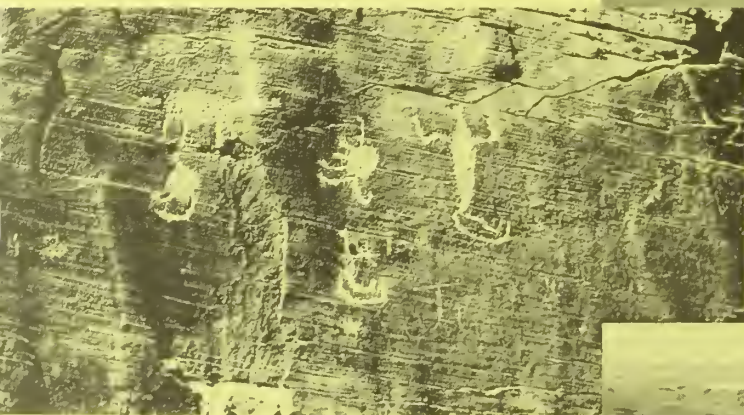
DESCRIPTION of PROJECT AREA





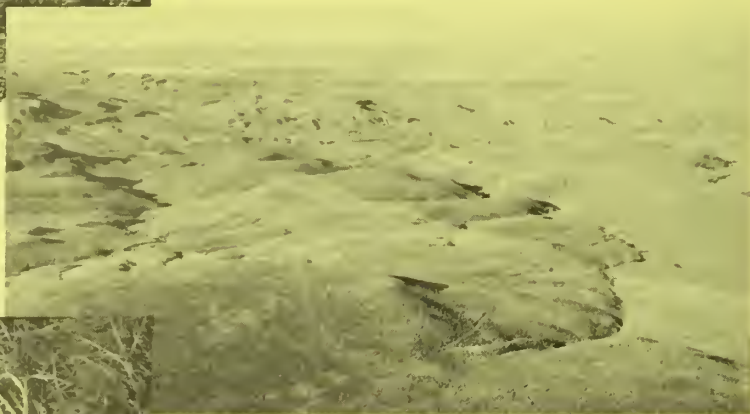
Top of the world from
the Beartooth Highway USFS Photo

Irrigated pastures



Primitive rock carvings BLM Photo

Rangelands



Fisherman's delight F&G Photo

Stripcropping and field
windbreak patterns



SECTION II

DESCRIPTION of PROJECT AREA

A. LOCATION AND SIZE (see location map)

The Beartooth Resource Conservation and Development Project Area is in south central Montana. The city of Billings, the largest in the state, is located just 20 miles northeast of the project and has a population of 60,549. It is bordered on the south by Wyoming, on the east by Bighorn and Yellowstone Counties, on the north by Golden Valley County, and on the west by Sweetgrass and Park Counties. The most scenic route to Yellowstone National Park is south along U. S. Highway 212, which passes through the project area. The elevation of Beartooth Pass at the Montana-Wyoming border is 10,940 feet above sea level, and is just 40 miles from the northeast corner of the Park boundary.

The 2,474,880 acres in the project area include 1,324,800 acres in Carbon County and 1,150,080 acres in Stillwater County. Federal ownership in the project amounts to 775,023 acres or 31 percent of the area. These lands are managed by the U. S. Forest Service, Bureau of Land Management, and the National Park Service. Land in private, state, and county ownership amounts to 1,699,857 acres or 69 percent of the area.

B. PHYSICAL FEATURES

CLIMATE (see precipitation map)

In this beautiful mountain setting the "Big Sky" of the Beartooth area provides a variety of climate that can be enjoyed by everyone. The high percentage of cloud-free days provides an abundance of sunshine and clean air that is now a luxury to many city dwellers. Summer daytime temperature are warm but mild. The chill of the night makes the use of a blanket a comfort while sleeping. Autumn season is one of beauty when the night time frosts turn the green of summer to one of golden glory. Warm sunshine and low humidity of the late Indian Summer often lasts through late November. The winter season brings tremendous snowfall to the high mountain country. Ski enthusiasts can enjoy this white blanket of beauty for several months. As springtime approaches, snow melt provides an abundance of clear cold water that is the life blood of the land.

Elevations and directions of slopes play a primary role in precipitation and temperature pattern. Precipitation variations are particularly noteworthy across the southern mountainous parts of the counties. Annual totals range from about 70 inches near the headwaters of East Rosebud and Clarks Fork River to less than 6 inches along the Clarks Fork south of Belfry. Only about 30 air miles separate these two points. The Belfry section of the Clarks

Fork Valley is the driest part of Montana. The "rain shadow" near Belfry is very apparent. The prevailing affect of west to southwest flow of air on precipitation is considerable. When the wind pattern reverses, the precipitation on the northeast upslope component at Red Lodge exceeds by several times the gradual slope in the Clarks Fork Valley at Belfry. Northward from the mountain front the precipitation decreases but less markedly. Less than 14 inches falls near the Yellowstone River at Columbus.

During the cold season nearly all precipitation falls as snow. At the lower elevations snow seldom remains on the ground for long periods. In the mountains and foothills snow begins accumulating in November most years, reaching greatest depths and water contents in April or early May. The melting of snowpacks during late spring and early summer contributes to the usually high runoff experienced in most years. Only the principal drainages in Carbon and Stillwater Counties have plenty of water during midsummer when water needs are greatest. Water shortages do occur in some areas in late summer. Occasionally, heavy rains in late May or early June will coincide with periods of peak runoff, and about one year in ten this combination will cause some flooding. Steady rains several hours long may occur any year during April, May, or June, but summer precipitation is almost always showery. Snows are heaviest in late fall or early spring depending on elevation. The heaviest snowfall months at Red Lodge are March and April which total approximately 40 inches. The yearly total is a little over 100 inches. Average snowfall in the high mountains is estimated to reach totals of several hundred inches. This decreases to less than 50 inches a year in the northern part of the counties. Snow depth on the ground at the higher elevations measure about 150 inches on May 1 in the average year.

The temperature range across the two counties is fairly wide. The annual average in mountain country southwest of Red Lodge is less than 40° F., while along the Yellowstone River annual averages reach about 47° F. or higher. In most of the area summer temperatures are fairly warm, but seldom reach oppressive levels. Red Lodge, for example, in a 30-year period averaged only three days per year with maximums of 90° F. or warmer. At lower elevations to the north this frequency may approach 20 to 25 days. Also at Red Lodge during the same 30-year period there were only 26 days a year with low temperatures of zero or colder. The 32° F. freeze-free season at Red Lodge averages 104 days, from June 5 to September 17. Along the Yellowstone between Columbus and Park City, the freeze-free period will be as long as 130 days. (May 16 - September 24).

The area is favorably situated with respect to the so-called "Chinook" winds of the northern Rockies. When this wind develops following a winter cold spell, warming is usually rapid. The temperature will rise as much as 40 to 50 degrees in less than a day.

The ease with which these wind conditions develop tends to shorten winter cold spells. Seldom does an invasion of really cold arctic air last more than three days. In some mountain valleys, wind currents can develop considerable strength, perhaps as strong as 100 mph gusts in local, more exposed areas. Severe storms are not a common occurrence, however, hailstorms, high winds, heavy snows, freezing rain and sleet, and small tornadoes have been observed at intervals in the counties. Hail damage occurs one year in ten at lower elevations to the south and is rather spotted and irregular in pattern. Tornadoes are rare, and when observed, they have always been small and mostly in the northern half of the area.

TOPOGRAPHY AND NATURAL DRAINAGE (see topographic map)

The topographic features of the project area are one of extremes, ranging from nearly flat valley bottoms and basins to magnificent mountainous plateaus with rugged peaks spiraling into the "Big Skies" of Montana. Most of the two-county area consists of rolling plains with low escarpments descending into the river valleys where alluvium has smoothed the valley floor. Elevations range from about 3,300 feet near Park City where the Yellowstone River leaves the project area to 12,610 feet at Silver Run Peak in the Beartooth Mountains near the Montana-Wyoming border. Much of the rugged Beartooth plateau is above timberline and consists of rocky peaks and basins carved by recent glaciers. Many small glacial lakes dot this picturesque landscape and are accessible only by trail.

The Beartooth Mountains cover several townships in the southwest portion of the project and because of their beauty, much of the area has been designated as primitive and is now under intensive study by the Forest Service. Another scenic and historical range of mountains in the project area are the Pryors, located in the southeastern section where the Bighorn River has deeply incised the landscape and forms the eastern boundary of the project. This range of mountains has peaks up to 9,000 feet and its configuration is more rolling than the Beartooth range.

The project area drains toward the north or east, except for local areas of south facing slopes in the mountainous region. There are several principal drainages in the project area. The Yellowstone River is the major stream and intercepts the flow of Stillwater River near Columbus. East and West Rosebud Creeks flow into the Stillwater River near Absarokee. Red Lodge and Rock Creeks enter the Clarks Fork of the Yellowstone near Rockvale, all of which drain the Beartooth Mountains. The Bighorn River drains the south and east facing slopes of the Pryor Mountains and its confluence with the Yellowstone River is near Hysham, 56 miles east of Billings. The very northern portion of Stillwater County drains into the Musselshell River which enters Fort Peck Reservoir on the main-stream of the Missouri River.

The physiographic complexity of the project area has a tremendous influence on climate, namely precipitation and temperature. This has influenced the kinds and amounts of vegetation and their affect on soil development.

GEOLOGY (see geology map)

Geologically, Stillwater and Carbon Counties are complex. The formations contain great variation in geologic structure and kinds of geologic materials. Numerous uplift and faulted areas are present. At least 30 separate geologic formations have been named and described and range in age from the very oldest (Precambrian) to the very recent (Quaternary). For simplicity these 30 formations have been combined into 11 mapable units, which are identified on the geology-groundwater map. Some igneous and metamorphic rocks are present, but the bulk of the exposed formations are of sedimentary origin - sandstone, shale and limestone.

Carbon County has two major mountain uplifts separated by a down-warp of sedimentary strata. The southwest corner of the area is occupied by the Beartooth Mountains and the southeast corner by the Pryor Mountains. The valley of the Clarks Fork of the Yellowstone and its tributaries occupy the intervening area between mountain uplifts.

The geologic structure in Stillwater County is dominated by the Big Coulee-Hailstone Dome. The highest point of the dome appears near the center of the east side of T 4 N, R 19 E, and from that point the dome is somewhat elongated in the direction of the Broadview Dome, which is a local uplift about 7 miles southwest of Broadview. From the crest of the dome, beds are inclined very gently toward the east, north, and northwest, but on the south the beds dip at angles ranging from 5 to 40 degrees. The strikes and dips vary considerably, owing to displacements caused by a great number of faults.

The oldest rock formations are Precambrian and are confined to areas in or near the mountains. These rocks are relatively hard and erode slowly. The Igneous and Metamorphic formations consist primarily of schist, gneiss, and granites. Rocks of Paleozoic age are predominantly limestones and sandstones which are hard and relatively resistant to erosion.

Surface rocks in the two-county area northeast of the Reed Point syncline are gently dipping Cretaceous sandstone and shale beds folded over an anticlinal structure. Big Coulee-Hailstone Dome is the more prominent expression to the northwest and the Pryor Mountain uplift to the southeast. Some Jurassic, Triassic, and Paleozoic sandstone, shale, and limestone beds are exposed in the Pryor Mountain uplift. The Cretaceous shale beds west of Fromberg yielded clay for a brick plant, which formerly operated in that area.

The Triassic Chugwater Formation is a potential source of high-grade gypsum. The (Mississippian) Madison Limestone is being quarried northeast of Warren as a source of lime for sugar refining. The Lake Basin oil and gas field is in northeastern Stillwater County. Uranium was once mined in the collapsed caverns of the upper part of the Madison Formation in the Carbon County section of the Pryor Mountains, and uranium exploration is currently active in that area. Bentonite is widespread in the upper units of the Cretaceous, but the beds are thin and the material is inferior to that in deposits elsewhere in the state. Nevertheless, some of the deposits could provide bentonite suitable for use locally in sealing irrigation ditches and stock ponds.

MINERALS (see minerals map)

There is a great deal of mineralization in the Beartooth project area. The mountainous formations contain rocks that are hosts to important metalliferous mineral deposits. Chromium deposits have been successfully mined in the past. Copper and nickel deposits now being developed show considerable promise. Platinum and gold deposits are also known to occur.

The basin portion of the project area contains deposits of coal, bentonite, gypsum, uranium, ceramic clay, limestone and decorative building stone. Extensive coal mining operations occurred in the Red Lodge and Bridger areas until the early 1940's when a mine disaster and lack of markets closed the mines.

Carbon County ranks second in the state in mineral value and returns. The annual return to the federal government is \$1,394,700 of which \$523,000 is returned to the state and distributed to the counties. Return from minerals in Carbon County to the initial user is estimated at \$4,030,000 annually.

Significant mineral deposits in the project are identified on the mineral resource map and described as follows:

- a. Bentonite - Extensive bentonite deposits occur in two major areas; east of the Clarks Fork of the Yellowstone River; the other is in the north central section of Stillwater County. Claims have been located in these areas and development of the deposits awaits further exploration and testing. Investigation of other areas shown on the accompanying map may disclose the presence of bentonite deposits of commercial value.
- b. Coal - There are eight major beds in the Red Lodge field and three discontinuous beds in the Bridger field. The bituminous coal deposits from the Red Lodge field are in the Fort Union Formation and considered to be a good grade. These beds range in thickness from $3\frac{1}{2}$ to 10 feet and all eight beds have been successfully mined in past years. The dip of the coal beds at

Red Lodge is 18 degrees to the southwest, 9 degrees at Bearcreek and only 3 degrees further south. The Bridger coal field occurs in the Eagle Sandstone Formation and has beds ranging from 2½ to 6 feet thick. This coal is subbituminous and has been mined near Joliet, Fromberg and Bridger. Although the coal is of a good quality, the thickness of the beds in relation to high costs makes present methods of underground mining impractical. The Silvertip and Stillwater coal fields are small and occur in the Eagle sandstone. These coal beds are 4 to 5 feet thick and occur at two or three levels.

- c. Gypsum - The Chugwater Formation of Triassic age has good quality commercial gypsum and deposits have been found east and south of Bridger. Pure gypsum has many commercial uses. In Montana, it is used primarily for sheet rock and as a soil amendment in the reclamation of sodic soils. In other states, it is used quite extensively in the manufacturing of plastic cement and wallboard, and in some cases as a cement retarder.
- c. Chromite - The chromite deposits in the southwest portion of Stillwater County are chemically classed as low grade (low ratio of chromium to iron) and at present cannot compete with other markets. Concentrated chromium ores are used in the production of domestic steel. High freight rates to industrial steel plants makes the shipment of low grade ore uneconomical. Processing of ore to higher grade products such as ferrochrome alloys or chromium chemicals is feasible, but requires marketing studies.
- e. Copper and Nickel - A rather large deposit of these metals with a grade equivalent to 0.8 percent copper occurs in the Stillwater drainage south of Nye. It was announced by the Western Mining News on April 18, 1969, that a core drilling program disclosed large tonnages of nickel-copper values lying close to the earth's surface where open pit mining is feasible. There has been some indication of a platinum-palladium discovery in the Picket Pin Mountain area. A gold prospect discovery was made east of Warren, but little is known of its potential.
- f. Uranium - Uranium deposits are known to occur in the Mississippian Madison limestone formation in the Pryor Mountains and east face of the Beartooth Mountains. Locally fluorite is associated with the uranium minerals, but to date has little commercial significance. Future exploration for uranium in the Pryor region maybe curtailed if more rigid controls on exploratory and assessment work are enacted to prevent serious erosion. Carnotite uranium salts in the area have not proven to be of commercial value.
- g. Oil and Gas - The oil and gas resource is not extensive in the project area, but both are being produced. The Elk Basin area

along the Montana-Wyoming border is the only active field, and sulphur is produced as a by-product. Dry Creek Basin in Carbon County and Lake Basin in Stillwater County are a potential source of both oil and gas. Oil companies are continuing their exploration for additional reserves.

- h. Limestone - Limestone rock of high grade is being quarried from the Madison Formation near Warren as markets demand. It is used mostly as a source of lime needed to refine sugar. Some of the better grade of quarried rock has been used for building stone.
- i. Sandstone - Sandstone rock has been quarried from the Lennep Formation for building stone in the Columbus area. In the early 1900's, many buildings were constructed from this stone which seems to withstand weathering. With current demands on the use of natural stone for building, a study should be made of marketing possibilities and the reopening of the quarry.
- j. Clay - Good quality clay has been used for manufacturing brick in the Fromberg area. Production of high grade ceramic and brick products could be resumed if markets were developed. Clay from the Fort Union Formation in western Carbon County has reportedly been mined for brick manufacturing and future development of these clay resources seems likely.

The U. S. Geological Survey and the Bureau of Mines are currently making a study of mineral sources in the Absaroka and Beartooth Primitive Areas to determine if these areas should be included in the Wilderness System. This would preclude the location of mining claims within the Wilderness areas after 1983.

SOILS (see general soils map)

The Beartooth RC&D project area has differences in topography, kinds of plants, and other features that are obvious, and also differences in the patterns of soils that are less easily seen. A general soil map was made by drawing lines around these patterns of soils. Each outlined area is called a soil association. As a rule, each association contains one or more major soils and several minor ones in a pattern that is characteristic, but not strictly uniform. Because of the relief, the depth to and nature of bedrock and other other features, soils within any association are likely to differ greatly from one area to another. Soil change can occur in rather short distances. Thus, the general soil map does not show the kind of soil at any particular place, but it does show land patterns made up of different kinds of soils. Soil associations are named to identify the major soil series in them, but soils of other series may also occur in the association. The major soil series in one association may also occur in another association but in a different pattern or extent.

The seventeen soil associations in the Beartooth RC&D Project have been placed in four main groups, as shown on the legend of the general soil map. In the first group are soils of the flood plains and narrow valleys; soils in the second group occur on gently rolling uplands and are underlain by shale or sandstone; the third group of soils are found on the outwash fans and terraces; and in the fourth group are soils of the steep mountains.

The general soil map was compiled from information available from detailed soil maps and field soil survey notes made in Carbon and Stillwater Counties. More detailed descriptions of the named soils can be obtained at the Soil Conservation Service offices in Joliet and Columbus.

The general soil map is most useful to people who want a general idea of soils in the area, and want to compare soils in different parts of the area. In the development of broad resource plans, you can locate large tracts of land that are suitable for certain kinds of farming or other land use. The general soil map is not suitable for detailed planning and management of a farm operation, because the soils in any association ordinarily differ in slope, depth, stoniness, drainage and other characteristics that affect their use. On site investigation is needed for the intensive use and management.

SOIL ASSOCIATIONS

DEEP, LOAMY, WELL DRAINED SOILS OF THE FLOOD PLAINS AND NARROW VALLEYS.

1. Haverson - Glenberg association:

This association comprises 24,800 acres or about 1 percent of the area. It is dominated by well drained, light colored loam and sandy loam soils with some areas of saline-alkaline loam soils on nearly level stream terraces. Elevations range from 3,000 to 3,500 feet. The annual precipitation is 10 to 14 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 120 to 130 days. Soils in this association are used primarily for row crops, small grains, hay and pasture.

Haverson soils have light colored loam or clay loam surface layers and calcareous light colored, stratified fine sandy loam, silt loam and clay loam subsoils. This soil is on nearly level stream terraces and comprises about 65 percent of the association. Areas will range from about 20 to 40 acres in size.

Glenberg soils have light colored fine sandy loam or loam surface layers and calcareous stratified light colored, fine sandy loam substratum. This soil is on nearly level to gently sloping flood plains or stream terraces and comprises about 30 percent of the association. Areas will range from about 5 to 15 acres in size.

Other soils make up to 5 percent of the association. These soils occupy fan terraces. Some resemble the Haverson soils, except they have developed subsoil layers over stratified alluvium. Shallow very cobbly soils occupy some stream terrace edges. Recent deposits of sand, gravel and silt occupy the river edges and some flood plains.

2. Heldt association:

This association comprises about 173,300 acres or 7 percent of the area. It is dominated by well drained, light colored clay loam soils and very gravelly high lime soils. It occurs in valleys, on stream terraces and alluvial fans. Elevation ranges from 3,000 to 4,000 feet. The annual precipitation is 5 to 12 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 120 to 130 days. Soils in this association are used primarily for row crops, small grains, hay and pasture.

Heldt soils have light colored, silty clay loam or clay loam surface layer and a weak blocky silty clay loam subsoil. Stratified alluvium can occur at depths of 10 to 30 inches or more. This soil occurs on nearly level to gently and moderately sloping stream terraces and fans and comprises about 60 percent of the association. Areas will range from about 20 to 300 acres in size.

Fort Collins soils have a dark colored silty clay loam or clay loam surface layer and a brown blocky silty clay loam subsoil layer. This is underlain by a light gray fine sandy loam calcareous substratum. Depth to bedrock is more than 60 inches. This soil is on nearly level to gently sloping stream terraces and comprises about 30 percent of the association. Areas will range from about 40 to 160 acres in size.

Other soils make up 10 percent of the association. These soils occur on fans and stream terraces and resemble the Heldt and Fort Collins soils in some respects. Textures most common are fine sandy loam and clay loam. Locally saline-alkaline soils occur on low terraces.

3. Maurice* - Pryor* - Dukon* association:

This association comprises about 198,000 acres or about 8 percent of the area. It is dominated by well drained and poorly drained, dark colored loam soils, and well drained, light colored sandy soils. Elevations range from 4,000 to 8,000 feet. The annual precipitation is 18 to 22 inches; mean annual soil temperature is 42 to 45° F. The frost free season is 90 to 110 days. Soils in this association are used primarily for range, irrigated pasture, meadow hay and a small acreage of small grains.

* Soil series names that are subject to change or have changed in field correlation.

Maurice soils have a dark colored loam or cobbly loam surface layers over very gravelly and cobbly silt loam subsoil layers. This soil is on nearly level to gently sloping alluvial stream terraces and comprises about 60 percent of the association. Areas will range from about 5 to 30 acres in size.

Pryor soils have a light colored, fine sandy loam on fine sand surface layer over a brown fine sandy loam or sandy loam subsoil. Sandstone bedrock occurs from 48 to 54 inches. This soil is under a thick stand of pine and comprises about 10 percent of the association. Areas will range from about 600 to 1,000 acres in size.

Dukon soils have a thin organic layer over a dark colored silty clay loam or silty clay surface layer. The subsoil is a very pale brown clay loam or silty clay loam, 18 to 24 inches thick. The substratum is a pale brown very fine sandy loam to clay loam. This is underlain by weathered shale and sandstone at about 50 inches. This soil occurs on moderately sloping to steep rolling upland and comprises about 25 percent of the association. Areas will range from 600 to 1,000 acres in size.

Other soils make up about 5 percent of the association. These soils occur on the nearly level stream terraces and gently rolling footslopes. Recent deposition of very cobbly material occupies the stream channels.

4. Shorey - Stormitt* - Garvin association:

This association comprises about 90,000 acres or about 4 percent of the area. It is dominated by well drained, light colored clay loam, very gravelly clay loam and shallow reddish brown loam soils. It occurs on alluvial fans, terraces and rough steep upland bedrock plains. Elevation ranges from 3,500 to 5,000 feet. The annual precipitation is 10 to 14 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for range, hay and small grains.

Shorey soils have light colored loam or clay loam surface layers over a brown silty clay loam subsoil. This is underlain by a nearly white or pale brown highly calcareous silty clay loam for more than 60 inches. This soil is on nearly level to gently and moderately to strongly sloping alluvial fans and footslopes and comprises about 40 percent of the association. It occurs in irregular pattern in areas of about 80 to 100 acres in size.

* Soil series names that are subject to change or have changed in field correlation.

Stormitt soils have light colored loam or very gravelly loam and stony loam surface layers. The subsoil is a light brown to pinkish white silty clay loam and very gravelly silty clay loam. This soil is on nearly level to gently and moderately to strongly sloping fans and stream terraces and comprises about 40 percent of the association. It occurs in irregular pattern in areas of about 80 to 600 acres in size.

Garvin soils have a reddish brown loam or fine sandy loam surface layer. The substratum is a pale red loam or clay loam about 16 inches thick over bedrock. This soil is on strongly sloping to steep rough upland shale bedrock plains and comprises about 15 percent of the association. Size of area varies because of the rough relief.

Other soils make up about 5 percent of the association. These soils occupy swales and stream terraces that are nearly level to gently sloping. These soils resemble the Shorey and Stormitt soils, except they have noncalcareous subsoil layers over deep alluvium. Highly alkaline soils may occur where shale beds are close to the surface.

5. Havre - Reedpoint* association:

This association comprises about 173,000 acres or about 7 percent of the area. It is dominated by well drained, light colored clay loam and loam soils. It occurs on valley bottoms and coalescing alluvial fans that are nearly level to gently and moderately sloping. Elevation ranges from 3,500 to 4,000 feet. The annual precipitation is 12 to 15 inches; mean annual soil temperature is 42 to 47° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for small grains, hay and pasture. A small acreage is used for row crops.

Havre soils have a light colored loam or clay loam surface layer and stratified loamy subsoil. The subsoil consists of 1 to 2 inch thick layers of fine sandy loam, clay loam, clay, silt loam and sandy loam textures. This soil is on nearly level stream terraces and valley bottoms and comprises about 45 percent of the association. Areas will range from 5 to 40 acres in size.

Reedpoint soils have a dark grayish brown clay loam or silty clay loam surface layer. The subsoil is a brown prismatic to blocky clay or clay loam over a deep brownish gray calcareous clay loam substratum. This soil is on nearly level to gently and moderately sloping coalescing alluvial fans and comprises about 40 percent of the association. Areas will range from 20 to 80 acres in size.

* Soil series names that are subject to change or have changed in field correlation.

Other soils make up about 15 percent of the association. These soils have profile characteristics that resemble the Havre and Reedpoint soils, except they have thicker surface layers and subsoils over deep alluvium. Saline soils may occur where drainage is poor.

DEEP, MODERATELY DEEP, AND SHALLOW CLAY SOILS OF THE SHALE AND SANDSTONE UPLANDS.

6. Midway - Travessilla - Lismas association:

This association comprises about 247,500 acres or about 10 percent of the area. It is dominated by shallow, excessively drained, light colored clayey and sandy soils developing on shale and sandstone bedrock. These soils occur on rolling to steep and hilly upland bedrock plains. Elevation ranges from 3,500 to 5,000 feet. The annual precipitation is 6 to 14 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 120 to 130 days. Soils in this association are used primarily for grazing. Small acreages along the large drainages are cultivated.

Midway soils are shallow light colored clay or clay loam soils over clayey, silty or sandy shale bedrock. The surface and subsoil layers are light grayish brown clay loam. The substratum consists of shale at depths of 20 inches or less. This soil occurs on moderately to strongly sloping and steep landscapes and comprises about 40 percent of the association. Areas will range from about 1,000 to 1,500 acres in size.

Travessilla soils have a thin light colored loam surface layer. The substratum of loam or fine sandy loam is 20 inches or less over sandstone bedrock. This soil occurs on strongly sloping to very steep landscapes and comprises 30 percent of the association. Areas will range from about 1,000 to 1,500 acres in size.

Lismas soils have a clay or silty clay surface and subsoil layers underlain by clay shale at depths less than 20 inches. The substratum of clay shale is high in alkali salts which limits production on this soil. This soil occurs on moderately to strongly sloping and steep landscapes and comprises about 20 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Other soils make up about 10 percent of the association. These are deep alluvial soils that occupy the swales, short footslopes, terrace remnants and narrow drainages. These soils have thicker surface layers and developed subsoils over deep alluvium and saline spots commonly occur.

7. Yawdim* - Cabba* - Rentsac* association:

This association comprises about 24,800 acres or about 1 percent of the area. It is dominated by shallow and moderately deep, well drained, light colored clayey or loamy soils on rolling to steep uplands. Elevation ranges from 3,500 to 4,500 feet. The annual precipitation is 15 to 19 inches; mean annual soil temperature is 42 to 45° F. The frost free season is 110 to 120 days. Soils of this association are used primarily for grazing and sparsely forested areas. A small acreage is cultivated.

Yawdim soils have light colored surface and subsoil layers of clay loam or clay underlain by thin substratum of clayey, silty and sandy shale at depths of 20 inches or less. This soil occurs on rolling to steep upland bedrock plains and comprises about 50 percent of the association. Areas will range from about 1,000 to 1,500 acres in size.

Cabba soils have a light colored surface and subsoil layers of loam, silty clay loam or clay loam underlain by white to olive colored clayey or sandy shale at 20 inches or less. This soil occurs on moderately sloping to rolling and steep landscapes and comprises about 30 percent of the association. Areas will range from 500 to 1,000 acres in size.

Rentsac soils have light colored surface layers of loam, silt loam, channery loam and very channery loam subsoils underlain at depths of 20 inches or less by sandstone bedrock. This soil occurs on moderately and strongly sloping to steep landscapes and comprises about 15 percent of the association. Areas will range from 250 to 1,000 acres in size.

Other soils of the association are found on wide footslopes, broad divides and narrow valleys. These soils have thick loam surface layers over clay loam subsoils formed in stratified loamy substratums. Small acreages of cultivated crops are grown on these soils.

8. Nunn - Wormser association:

This association comprises about 24,800 acres or about 1 percent of the area. It is dominated by well drained, light colored loam and clay loam soils with clay subsoils, and shallow loam soils on sandstone. Elevation ranges from 3,500 to 4,000 feet. The annual precipitation is 10 to 14 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 120 to 130 days. Soils of this association are used primarily for row crops, small grains, hay and pasture.

* Soil series names that are subject to change or have changed in field correlation.

Nunn soils have a light colored silty clay loam or clay loam surface layer and a silty clay loam or clay prismatic to blocky subsoil. This is underlain by a brown or yellow thick calcareous silty clay loam substratum. This soil occurs on nearly level to gently sloping stream terraces and fans and comprises about 60 percent of the association. Areas will range from about 200 to 500 acres in size.

Wormser soils have light colored loam or clay loam surface layers and a brown clay loam or clay prismatic to blocky subsoil. This is underlain by a gray sandstone at depths between 20 and 60 inches. This soil is on moderately sloping to steep landscapes and comprises about 30 percent of the association. Areas will range from 50 to 80 acres in size.

Other soils make up about 10 percent of the association. These soils occur in narrow valleys on broad footslopes and divides. They resemble the Nunn and Wormser soils, except they do not have developed subsoil and may be shallower to bedrock. Saline soils may occur in places.

9. Absarokee - Maginnis association:

This association comprises about 346,500 acres or about 14 percent of the area. It is dominated by well drained, dark colored clay loam soils and light colored, moderately deep clay loam soils over sandstone. This association is on gently to moderately sloping broad ridges and steep upland bedrock plains. Elevation ranges from 3,500 to 4,500 feet. The annual precipitation is 15 to 19 inches; mean annual soil temperature is 42 to 45° F. The frost free season is 110 to 120 days. Soils of this association are used primarily for dryland crops and range.

Absarokee soils have dark colored surface layers of loam or clay loam over brown blocky clay or clay loam subsoils. The substratum below 18 to 20 inches is a pale olive clay for a depth of 35 to 40 inches. Pale olive massive stratified clayey, silty and sandy shale occurs within depths of 40 inches. This soil is on gently to moderately and strongly sloping upland bedrock plains and comprises about 60 percent of the association. Areas will range from 250 to 1,000 acres in size.

Maginnis soils have a dark colored surface layer of clay loam or channery clay loam over a grayish brown very channery clay loam subsoil. The substratum is hard sandstone bedrock at depths of 20 inches or less. This soil is on gently to moderately and sloping footslopes and narrow divides and comprises about 35 percent of the association. Areas will range from about 200 to 500 acres in size.

Other soils make up 5 percent of the association. These soils occupy the narrow valleys, wide footslopes and broad divides that are gently to moderately sloping. These soils resemble the Absarokee and Maginnis soils, except they are deeper to bedrock and are on less sloping landscapes.

10. Pierre - Lismas - Kyle association:

This association comprises 49,500 acres or about 2 percent of the area. It is dominated by well drained, light colored clay soils on moderately to strongly sloping and steep hilly shale bedrock uplands. Elevation ranges from 3,500 to 4,000 feet. The annual precipitation is 10 to 14 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for grazing. A small acreage is cultivated. Small grains and hay are principal crops.

Pierre soils have a light colored clay or silty clay surface and subsoil layers underlain by shale at depths of 20 to 40 inches. This soil is on moderately to strongly sloping shale bedrock uplands and comprises about 40 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Lismas soils have a clay surface and subsoil layers underlain by clay shale at 20 inches or less. The substratum of clay is high in alkali salts which limits production on these soils. This soil occurs on moderately to strongly sloping and steep landscapes and comprises about 30 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Kyle soils have a clay surface and subsoil layers to depths of more than 60 inches. This soil is on gently to moderately and strongly sloping valley footslopes, alluvial fans and valley floors and comprises about 25 percent of the association. Areas will range from 100 to 250 acres in size.

Other soils make up about 5 percent of the association. These are barren shale, very shallow to sandstone and deep swales and terrace remnants. The deeper soils resemble the Lismas and Kyle, except they may be more than 20 inches to bedrock or may lack a subsoil layer. Many dense alkali soils occur in the association but are small in size.

11. Berry* - Fiddler* association:

This association comprises about 198,000 acres or about 8 percent of the area. It is dominated by well drained, dark colored clay loam soils and moderately deep and shallow soils over shale and

* Soil series names that are subject to change or have changed in field correlation.

sandstone bedrock. Elevation ranges from 4,000 to 4,500 feet. The annual precipitation is 12 to 15 inches; mean annual soil temperature is 45 to 47° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for dryland cultivation and range.

Berry soils have a grayish brown silty clay loam or clay loam surface layer over a prismatic to blocky silty clay subsoil. The substratum is a light colored calcareous silty clay loam to a depth of about 30 inches. Below about 30 inches is clayey, silty and sandy shale. This soil is on gently to moderately and strongly sloping landscapes and comprises about 60 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Fiddler soils have a dark colored channery loam or channery sandy loam surface layer. The substratum is a pale brown very channery loam to a depth less than 10 inches over indurated sandstone. This soil is on moderately sloping to steep hilly uplands and comprises about 35 percent of the association. Areas will range from about 50 to 100 acres in size.

Other soils make up about 5 percent of the association. These soils occur on terrace remnants, very shallow bedrock plains and deep alluvial fans and stream terraces. They resemble the Berry and Fiddler soils except the substratums are gravelly or hard sandstone. Other minor soils are deep over bedrock and have thicker surface layers.

12. Midway association:

This association comprises 24,800 acres or about 1 percent of the area. It is dominated by shallow excessively drained, light colored clay soils on shale and sandstone upland bedrock plains. The annual precipitation is 12 to 14 inches; mean annual temperature is 47 to 49° F. The frost free season is 110 to 120 days. Soils in this association are used for grazing. Only small fields along large drainages are cultivated.

Midway soils have light colored clay or clay loam surface and subsoil layers underlain at depths of less than 20 inches by clayey, silty or sandy shale beds. This soil occurs on strongly sloping to steep and very steep bedrock plains and comprises about 90 percent of the association. Areas will range from about 1,000 to 1,500 acres in size.

Other soils make up about 10 percent of the association. These soils include deep, very shallow and barren shale or rockland areas. The deep soils are on the valleys of the large drainages or colluvial footslopes. Many sandstone cliffs and rock outcrops occur. The very shallow soils occur on narrow ridges and divides. The valley soils are on gently to moderately sloping areas.

13. Wormser - Lavina association:

This association comprises about 74,300 acres or about 3 percent of the area. It is dominated by well drained, light colored clay loam and loam soils with clay subsoils and shallow loam soils on sandstone uplands. The annual precipitation is 12 to 15 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for small grains and range.

Wormser soils have a light colored loam or clay loam surface layer and a brown clay loam prismatic to blocky subsoil. This is underlain by a light brownish gray clay loam substratum. Hard gray sandstone occurs at depths of less than 60 inches. This soil is on moderately to strongly sloping landscapes and comprises about 55 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Lavina soils have very thin brown loamy surface layers. A brown prismatic blocky structured subsoil, resting on hard sandstone bedrock at depths of 20 inches or less. This soil is on moderately to strongly sloping and steep bedrock uplands and comprises about 35 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Other soils make up about 10 percent of the association. These soils are on wide medium length footslopes, swales, broad divides and narrow valley floors of drainageways. They resemble the Wormser and Lavina, except for more variation in depth and some may lack a subsoil development. Sandstone rock outcrops are common on the steeper areas.

DEEP AND MODERATELY DEEP LOAMY SOILS OF THE OUTWASH TERRACES AND FANS.

14. Belfry* - Charlos - Sayne* association:

This association comprises 222,800 acres or about 9 percent of the area. It is dominated by well drained, dark colored loam and sandy soils. It occurs on high terraces, steep uplands and mountain footslopes. Elevation ranges from 4,000 to 6,000 feet. The annual precipitation is 16 to 22 inches; mean annual soil temperature is 40 to 45° F. The frost free season is 90 to 110 days. Soils in this association are used primarily for growing small grains, meadow hays, pasture and range.

* Soil series names that are subject to change or have changed in field correlation.

Belfry soils have dark colored loam or silty clay loam surface layers and a prismatic blocky silty clay loam subsoil, underlain by a nearly white calcareous clay loam substratum. Depth to shale bedrock is more than 40 inches. This soil is on moderately to strongly sloping and moderately steep hilly to steep landscapes and comprises about 40 percent of the association. Areas will range from about 500 to 750 acres in size.

Charlos soils have dark colored loam and gravelly loam surface layers and a prismatic to blocky clay loam subsoil 10 to 30 inches thick. The substratum for more than 60 inches is a gravelly clay loam and gravel, cobbles, boulders, coarse sand and fine sand. This soil is on nearly level to gently and moderately sloping outwash terraces and comprises about 30 percent of the association. Areas will range from about 200 to 500 acres in size.

Sayne soils have dark colored clay loam or loam surface layers and a weakly developed brown clay loam subsoil. This is underlain by a clay loam substratum for 30 to 40 inches. Bedrock of clayey shale and sandstone is 30 to 40 inches below the surface. This soil is on narrow ridges, divides and knolls that are moderately to strongly sloping and comprises about 20 percent of the association. Areas will range from about 200 to 450 acres in size.

Other soils make up about 10 percent of the association. These include dark colored soils on alluvial fans, deep soils in narrow drainageways and shallow soils on very steep bedrock uplands. They resemble the Belfry, Charlos and Sayne soils, except for amounts of lime in substratum, depth to gravel and bedrock.

15. Romberg* - Loma* association:

This association comprises about 49,500 acres or about 2 percent of the area and occurs on glaciated outwash terraces. It is dominated by well drained, light colored, very gravelly and stony loam soils, with very gravelly substratums. Elevation ranges from 3,500 to 5,000 feet. The annual precipitation is 5 to 12 inches; mean annual soil temperature is 47 to 49° F. The frost free season is 110 to 120 days. Soils in this association are used primarily for grazing. A small acreage is used for growing hay and small grains.

Romberg soils have a light colored gravelly loam or stony loam surface layer and a gravelly clay loam subsoil. This is underlain by pale brown calcareous gravelly clay loam substratum.

* Soil series names that are subject to change or have changed in field correlation.

This soil is on moderately to strongly sloping glaciated outwash terraces and comprises about 50 percent of the association. Areas will range from about 1,000 to 1,500 acres in size.

Loma soils have a light colored loam or stony loam surface layer and a blocky cobbly or stony loam subsoil 20 to 25 inches thick. This is underlain by a coarse sand and stony and gravelly lime segregated substratum. This soil is on moderately to strongly sloping and steep glaciated outwash terraces and comprises about 40 percent of this association. Areas will range from about 500 to 600 acres in size.

Other soils make up to about 10 percent of the association. These include deep sandy loam soils and shallow clay loam soils on valley bottoms and smooth footslopes. The deep soils resemble the Romberg soils and the shallow soils the Loma soils. Areas of steep sandstone cliffs and limestone are included, but are of limited extent. Small grain and hay crops are grown on the valley bottoms and narrow drainages.

STEEP, SHALLOW AND VERY SHALLOW LOAMY SOILS OF THE MOUNTAINS.

16. Lap* association:

This association comprises about 99,000 acres or about 4 percent of the area. It is dominated by shallow and deep well drained, dark colored loam soils over limestone on moderately sloping to steep and very steep mountain slopes. Elevation ranges from 5,000 to 9,000 feet. The annual precipitation is 14 to 20 inches; mean annual soil temperature is 42 to 45° F. The frost free season is 50 to 90 days. Soils of this association are used for summer grazing.

Lap soils have a thin grayish brown gravelly loam or stony loam surface layer and a very pale brown, very gravelly calcareous loam substratum. Depth to hard limestone is 20 inches or less. This soil is on steep mountain slopes of limestone bedrock and comprises about 90 percent of the association. Areas will range from about 500 to 1,000 acres in size.

Other soils make up about 10 percent of the association. These include deep dark colored soils, with strong prismatic and blocky subsoils. The substrata is usually heavy red clay over limestone or sandstone. Shallow and moderately deep soils with highly calcareous substrata are found on the gently to moderately and strongly sloping mountain tops and smooth slopes.

* Soil series names that are subject to change or have changed in field correlation.

17. Mountainous and Alpine soils:

This area comprises about 445,500 acres or about 18 percent of the area. It is dominated by well drained, shallow and very shallow, dark colored, non-limey, gravelly and stony soils. They occur on high plateaus and steep precipitous barren rock canyons. Elevation ranges from 6,000 to 12,610 feet. The highest peak is Silver Run Peak at 12,610 feet. A number of other peaks are 12,000 feet or higher. The area is dotted with many small lakes. The annual precipitation is 22 to 70 inches; mean annual soil temperature is less than 35 to 40° F. The area is used primarily for recreation and wildlife.

Soils of the mountain meadows are deep to moderately deep, well drained stony or gravelly loamy soils with dark colors predominating. Most stream valleys have deep gravelly and stony alluvium with a very thin surface layer. Permafrost areas are in the alpine meadow area. Length of growing season is 50 days or less. Local glaciation occurs on the headwalls of the steep granitic walled canyons.

LIMITING SOIL PROPERTIES and OTHER FACTORS by NUMBER in TABLE I for SELECTED LAND USES

Limitations are indicated in the table as "slight," "moderate," or "severe." The number indicates the major hazard or limitation.

1. Flooding or ponding
2. Seasonal high water table
3. Shrink-swell potential
4. Frost heave potential
5. Susceptibility to settling
6. Depth to bedrock
7. Unfavorable slopes
8. Slow permeability less than .65 inches per hour
9. Moderate permeability .65 to 1.0 inches per hour
10. Rapid permeability more than 1.0 inches per hour
11. Load-bearing capacity
12. Surface texture and depth
13. Coarse fragments (large gravel, cobbles and stone)
14. Stickiness and plasticity
15. Unfavorable clay or silty content
16. Hazard or ground water pollution
17. Unfavorable lime content
18. Piping hazard

TABLE 1. ESTIMATED SOIL LIMITATIONS OR SUITABILITY FOR SELECTED USES

SOIL ASSOCIATION AND SYMBOL (1)	SOIL SERIES (2)	% OF THE SOIL ASSOC. (3)	SOIL LIMITATIONS FOR										SUITABLE AS SOURCE OF	
			BUILDING SITE (4)	SEPTIC TANK FILTER FIELD (5)	HIGHWAY & STREET LOCATION (6)	POND SITE RESERVOIR AREA (7)	CAMPING (8)	PICNIC AREA (9)	PLAYGROUND (10)	LAWN AND LAND-SCAPING (11)	CROPPING (12)	EMBANKMENT MATERIAL (13)	TOP- SOIL (14)	FILL MATERIAL OTHER THAN EMBANKMENT (15)
1 Haverson-Glenberg association	Haverson Glenberg	65 30	Severe 1,2,4 Severe 1,2,4 Severe 1,2,4	Severe 2,16 Severe 1,2,12,16	Severe 4,5 Severe 1	Mod. 1,8 Severe 10	Severe 1,2 Severe 1,2	Mod. 1,2 Moderate 1	Severe 1,2 Severe 1,2	Slight Slight	Mod. 1,2 Mod. 1,2	Fair Fair	Good Good	Fair Good
2 Heldt association	Heldt	60	Severe 3,15 Slight	Severe 8 Slight	Moderate 3,15 Slight	Slight Slight	Moderate 12,14 Slight	Moderate 12,14 Slight	Moderate 12,14 Slight	Moderate 12,14 Slight	Slight Slight	Fair Poor	Fair Good	Fair Fair
3 Maurice-Pryor-Dukon association	Maurice Pryor Dukon	60 10 25	Severe 1,2 Severe 6,7 Severe 7,6	Severe 1,2,16 Severe 7 Severe 7	Moderate 2,4 Mod. 6,7 Severe 7,6	Severe 10 Severe 6,7 Severe 7,6	Moderate 13 Severe 7,6 Severe 7,6	Moderate 13 Severe 7,6 Severe 7,6	Severe 13 Severe 7,6 Severe 7,6	Moderate 13 Severe 7,6 Severe 7,6	Severe 13 Severe 7,6 Severe 7,6	Poor Poor Good	Poor Good Good	Good Good Good
4 Shorey-Stormitt-Garvin association	Shorey Stormitt Stormitt	40 40	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	Slight Slight	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	(Slight 1/ (Moderate 2/ (Severe 3/-	Fair Fair Fair	Fair Fair Fair	Good Good Poor
5 Havre-Reedpoint association	Havre Reedpoint	15 45 40	Severe 6,7 Severe 1,4 Mod. 3,4	Severe 6,7 Severe 2,16 Severe 8	Severe 6,7 Severe 4,5 Mod. 3,8	Severe 6,7 Moderate 9 Slight	Severe 7,6 Moderate 12 Moderate 12	Severe 7,6 Moderate 12 Moderate 12	Severe 7,6 Moderate 12 Moderate 12	Severe 7,6 Moderate 12 Moderate 12	Severe 7,6 Moderate 12 Moderate 12	Poor Poor Good	Good Good Fair	Poor Fair Fair
6 Midway-Travessilla-Lismas association	Midway Travessilla Lismas	40 30 20	Severe 6,7 Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7 Severe 6,7	Slight Severe 10, 7	Severe 7,15 Severe 7,15	Severe 7,14 Severe 7,14	Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7	Good Poor Good	Poor Poor Poor	Fair Poor Poor
7 Yawdim-Cabba-Rentsac association	Yawdim Cabba Rentsac	50 30 15	Severe 6,7 Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7 Severe 6,7	Slight Slight Severe 10, 7	Severe 7,15 Severe 7,15	Severe 7,14 Severe 7,14	Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7	Severe 6,7 Severe 6,7	Good Good Good	Poor Poor Poor	Fair Fair Fair
8 Nunn-Wormser association	Nunn Wormser	60 30	Severe 3,15 Slight	Severe 8, 15 Severe 8, 15	Moderate 3, 15 Moderate 3, 15	Slight Slight	Moderate 12,15 Moderate 12,15	Moderate 12,14 Moderate 12,14	Moderate 12,14 Moderate 12,14	Moderate 12,14 Moderate 12,14	Slight Slight	Good Good	Fair Fair	Fair Fair
9 Absarokee-Maginnis association	Absarokee Maginnis	60 35	Moderate 3 Moderate 6 7	Severe 6,8 Severe 6,8	Severe 3,11 Moderate 6, 7	Slight Moderate 6, 6	Moderate 12,14 Moderate 12,14	Moderate 12,14 Moderate 12,14	Moderate 7, 14 Moderate 6, 7	Severe 12,14 Severe 12,14	Moderate 6, 15 Severe 3,15	Poor Fair	Fair Fair	Fair Fair

1/ 0 to 5 percent slopes 2/ 5 to 15 percent slopes 3/ More than 15 percent slopes

TABLE 1. ESTIMATED SOIL LIMITATIONS ON SUITABILITY FOR SELECTED USES (CONT'D)

SOIL ASSOCIATION AND SYMBOL (1)	SOILS SERIES (2)	% OF THE SOIL ASSOC. (3)	SOIL LIMITATIONS FOR										SUITABLE AS SOURCE OF FILL MATERIAL OTHER THAN EMBANKMENT (14) (15)	
			BUILDING SITE (4)	SEPTIC TANK & STREET LOCATION (5)	HIGHWAY LOCATION (6)	POND SITE RESERVOIR AREA (7)	CAMPING (8)	RECREATION PICTNIC AREA (9)	PLAYGROUND (10)	LAWN AND LAND-SCAPING (11)	CROPPING (12)	EMBANKMENT MATERIAL (13)		
10 Pierre-Lismas-Kyle association	Pierre	40	Severe 3,7	Severe 8,3	Severe 3,11	Slight	Severe 12,15	Severe 12,14	Severe 12,14	Severe 12,14	Moderate 7,15	Poor	Poor	Poor
	Lismas	30	Severe 6,7	Severe 8,3	Severe 6,7	Slight	Severe 12,15	Severe 12,14	Severe 12,14	Severe 12,14	Severe 6,7	Poor	Poor	Poor
	Kyle	25	Severe 3,7	Severe 8,3	Severe 3,11	Slight	Severe 12,15	Severe 12,14	Severe 12,14	Severe 12,14	Moderate 8,15			
11 Berry-Fiddler association	Berry	60	Moderate 3,6	Severe 6,8	Severe 3,11	Slight	Moderate 12,14	Moderate 12,14	Moderate 7,14	Moderate 7,14	Moderate 7,6	Fair	Fair	Fair
	Fiddler	35	Mod. 6,7	Severe 6,7	Severe 6,7	Severe 10,6	Severe 7,6	Severe 7,6	Severe 6,13	Severe 6,7	Severe 6,7	Poor	Poor	Poor
12 Midway association	Midway	90	Severe 6,7	Severe 6,7,8	Severe 6,7	Slight	Severe 7,14	Severe 7,14	Severe 6,7	Severe 6,7,12	Severe 6,7	Good	Poor	Fair
13 Wormser-Lavina association	Wormser	55	Slight	Severe 8	Moderate 3,15	Slight	Moderate 12,14	Moderate 12,14	Moderate 12,14	Moderate 12,14	Slight	Good	Fair	Fair
	Lavina	35	Mod. 6,14	Severe 6,7	Severe 6	Severe 10	Mod. 12,14	Mod. 12,14	Severe 6	Moderate 6,14	Severe 6,7	Poor	Fair	Fair
14 Belfry-Charles-Sayne association	Belfry	40	Severe 3,7	Severe 7,8	Moderate 3,7	Slight	Moderate 12,14	Moderate 12,14	Moderate 7,14	Slight	Moderate 7,14	Fair	Good	Fair
	Charles	30	Slight	Moderate 2,16	Slight	Moderate 9	Slight	Slight	Moderate 14,6	Slight	Slight	Fair	Good	Good
	Sayne	20	Severe 6,7	Severe 6,7	Severe 6,7	Slight	Severe 7	Severe 7,14	Severe 6,7	Severe 6,7	Severe 6,7	Good	Poor	Fair
15 Romberg-Loma association	Romberg	50	Severe 13,9	Severe 13,7	Moderate 13,7	Severe 10	Severe 13,7	Severe 13,7	Severe 13,7	Severe 13,7	Severe 13,7	Poor	Poor	Poor
	Loma	40	Severe 13,9	Severe 13,7	Mod. 7,13	Severe 10,7	Severe 13,7	Severe 13,7	Severe 7,13	Severe 12,13	Severe 13,7	Poor	Poor	Poor
16 Lap association	Lap	90	Severe 6,7	Severe 6,7	Severe 6,7	Severe 6,10	Severe 7	Severe 7	Severe 7	Severe 7	Severe 7	Poor	Poor	Poor
17 Mountainous and alpine soils		100												
1/ 0 to 5% slopes			2/ 5 to 15% slopes			3/ More than 15 % slopes								

LAND OWNERSHIP (see ownership map)

Land ownership is constantly under change. The following data gives a general breakdown of the major users of land in the project area.

	<u>Acres</u>
Private and Local Government	1,612,179
State Owned Lands	87,678
National Forest and Grassland	501,205
Bureau of Land Management	243,818
Bighorn Canyon National Recreation Area ^{1/}	30,000
Total	<u>2,474,880</u>

Land use on private and state owned lands is as follows: (Based on the 1967 Conservation Needs Study)

	<u>Acres</u>	<u>Percent</u>
Towns, Roads and Water	25,298	1.4
Non-agricultural	15,178	0.9
Dry Cropland	316,654	18.0
Irrigated Cropland	109,698	6.2
Range and Pasture	1,184,244	67.2
Woodland	<u>111,066</u>	<u>6.3</u>
Total	<u>1,762,138</u>	<u>100.0</u>

There are 1,238 farms in the Beartooth area, 35 percent ranging in size from 1 to 100 acres. Seventy percent or 859 farms irrigate some or all of their land. Forty-eight percent of the irrigated farms range in size from 1 to 100 acres. Thirty-five percent of the farms classify as grain farms, 25 percent as livestock farms and 40 percent are combination farms.

LAND USE (see land use map)

More than 60 percent of the land in the project area is in range or pasture that is used for the grazing of livestock and game animals. The woodland acreage, most of which is grazable, totals 280,000 acres. About 24 percent of the private and state owned land is being cropped and used for the production of hay, small grain, sugar beets corn, potatoes and beans. Grass seed production is increasing in importance. The irrigated cropland in the project amounts to 109,698 acres and there are 17,510 acres of irrigated pasture. The economy of the agricultural resource in the area is closely tied to production on the cropland acres. With the multiple use concept, nearly all of the land in the project is highly suited to recreation use and development.

^{1/} This National Park was designated after the 1967 Conservation Needs Study -- 26,000 acres came from Bureau of Land Management and 4,000 from private lands.

The preceding data shows the most recent inventory of land use on private and state lands for the two-county area.

PLANT RESOURCES

- a. Irrigated Land - Irrigated crops in the project area includes small grain, hay, corn, sugar beets and beans and comprise 109,698 acres. There are 17,510 acres of irrigated pasture. This represents a little more than 5 percent of the total area and 27 percent of the cropland and pasture. About 57 percent of the irrigated cropland is in land capability Classes I and II. Forty-two percent is classified as III and IV, which is used primarily for hay and pasture. Nearly 94 percent of the irrigated lands needs improved irrigation systems or management.
- b. Non-irrigated Cropland - Nearly 13 percent of the land in the project area is being used for non-irrigated crop production. A summer fallow system of farming is used to produce small grains and the fallow land represents nearly 40 percent of the dry cropland. There is no dry cropland in Class I. Slightly more than 8 percent of the dry cropland is in Class II; 64 percent is in Class III; and nearly 20 percent is in Class IV. Small grain and summer fallow represent more than 80 percent of the dry cropland use. Nearly 55 percent of the dry cropland needs improved management to control erosion.
- c. Range and Pasture Land - The rangeland resource amounts to 1,588,925 acres or about 64 percent of the project area. It includes native ranges, grazed woodlands and dryland tame pastures. About 75 percent is privately owned while 25 percent is administered by federal agencies. The grazing resource from federally managed lands is very important to the economy of the project area. Many private operators are dependent on these leases to provide an economic base for their livestock units. The forage resource can be improved on about 60 percent of the native range and 85 percent of the tame pasture.

The Beartooth area has been grazed by cattle, sheep and horses since the 1870's. The southern portion of project area is primarily rangeland. The northern range areas are generally intermingled with croplands.

The Clarks Fork River drainage in Carbon County was a favorite range for sheep in the early days. Summering in the Beartooth and Pryor Mountains was a common practice. A minimum of winter feeding was the usual practice.

The rangeland provides a home for big game, upland game birds and other wildlife. Sound management planning is necessary to avoid conflicts in the complex interrelationship of the many rangeland uses.

As the land became settled and population centers began to develop, additional uses of the land became apparent. They are wildlife habitat, water production, pollution abatement, erosion control, recreation areas, and space for urban and industrial expansion.

Wide variations in the annual precipitation reflect great difference in kinds and amounts of vegetation. The 5 to 9 inch precipitation zone in the south central area supports a desert-like vegetation. Grasslands in the high elevation where there is more rainfall support taller growing, more luxuriant vegetation.

Within the project area are many different range sites. Each range site is a kind of soil in a given climate that is capable of producing a certain kind and amount of vegetation. (Refer to soils section). The geology of portions of the area contributes a considerable amount of natural sediments. Good range management will help to minimize soil erosion and sedimentation as well as improve the forage resource.

- d. Forest and Woodlands - The woodland resource in the Beartooth RC&D Project comprises 191,439 acres of commercial forest and 468,086 acres of non-commercial or non-forestland, part of which is sub-alpine within the Custer National Forest and lies above timberline.

The private and state owned woodlands based on the 1967 Conservation Needs Study, comprise 111,066 acres, of which 62 percent is considered as commercial. The forestry committee feels that only the medium and well stocked portions of the commercial forest land with adequate accessibility and soil stability should be considered as being capable of producing marketable wood products. For this report, these forest acres are designated as "Commercially Operable" and form the basis for analyzing the value of the state and private forests. State and private timber lands can be effectively grouped into three physiographic land forms, foothills, steep breaks and stream bottoms.

The estimate of forest land presented in this report was determined from a broad reconnaissance inspection and the use of aerial photographs. It should be used only as a general indication of available woodlands. A more detailed and complete inventory is needed to properly appraise this resource.

Privately owned woodland and other agricultural lands are presently protected from fire by nine rural fire districts and the two sheriff's offices. On the average, there are 98 fires on these lands per year. Of these, approximately 72 percent are wildfires, most of which are man-caused. Lightning storms

cause a small number of the total fires. There is a need for additional fire protection units and a more intensive action program to coordinate local fire protection with a state-wide system. Training and backup forces are needed. The first step of instigating an adequate fire control program was taken in April, 1970, when the county commissioners of both counties endorsed cooperative fire protection agreements with the State Board of Forestry. Some assistance is needed through RC&D in implementing an improved program, procurement of equipment, fire detection and fire suppression.

Much of the commercially important timber in the project area is located on steep north exposures and in narrow, deeply cut drainages. Management studies are needed on these potentially erodable sites to provide information upon which to base guidelines for future forest activities.

Timber harvesting should not conflict with recreation and preservation of aesthetic beauty in high visitor use areas. Much of the privately owned timber land in the foothill landscape is located or adjacent to prime recreation sites. The high aesthetic and recreational values of these lands can be maintained through proper planning and supervision of timber harvesting operations.

Physiographic Land Forms:

1. Foothill type
(22,400 Acres)
Douglas-fir and lodgepole pine with some aspen in low areas and ponderosa pine on south exposures. The terrain ranges from gently rolling to steep and is dominated by shallow to moderately deep or deep rocky and stony soils on the lower slopes of the mountainous soils.
2. Break type
(73,600 Acres)
Ponderosa pine with small amounts of limber pine and Rocky Mountain juniper. This slow growing, low quality commercial timber is found on steep north and west facing slopes along deeply entrenched drainageways. The soils are of the Yawdim-Cabba-Rentsac association.

3. Stream bottom type
(15,000 Acres)

Mostly cottonwood and aspen in narrow stringers and small patches on stream terrace and flood plain area. The soils are predominantly in the Maurice, Pryor, Haverson and Glenberg series.

The area has high recreational use and provides shelter for livestock and wildlife.

SUMMARY of WOODLAND INVENTORY
CARBON and STILLWATER COUNTIES
Beartooth RC&D Project

Private & State	Physiographic Land Forms			Acres
	1	2	3	
Total acres	22,400	73,600	15,000	111,000
Non-operatable and non-commercial	6,000	28,900	7,600	42,500
Commercial	16,400	44,700	7,400	68,500
Small private				
Non-stocked and poor	1,500	27,600	1,200	30,300
Medium and well-stocked (Commercially operable)	11,200	15,300	6,100	32,600
State				
Non-stocked and poor	--	1,100	100	1,200
Medium and well-stocked (Commercially operable)	3,700	700	--	4,400

The forestry resource on federal lands amounts to 47,320 acres managed by the Bureau of Land Management and 121,119 acres of commercial forest managed by the Forest Service. Timber production from lands managed by the Bureau of Land Management is limited primarily because of species and low site quality of commercial trees. Many of these forest lands are of more value for aesthetics, recreation and erosion control than for wood products. Estimated acreage by species of timber type are:

Juniper	40,000 acres
Mountain mahogany	5,500 acres
Douglas-fir	1,780 acres
Mixed fir-spruce	40 acres

The National Forest land within the Beartooth RC&D project area comprises about one-half million acres, of which 121,119 acres are of commercial quality. The availability of the timber for future use hinges on the result of a coordinated resource management study now in progress of the Beartooth Primitive Area.

This study is required by law under the Wilderness Act of 1964 and is to be completed by 1973.

Existing timber inventories and classification information show the following breakdowns of the timber resource on National Forest land.

FORESTRY RESOURCE on the NATIONAL FOREST

	Commercial Forest		Nonforest and	
	Stocked	Nonstocked	Noncommercial	Total
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Pryor Block	32,551	1,659	39,774	73,984
Beartooth Block	<u>85,927</u>	<u>982</u>	<u>340,312</u>	<u>427,221</u>
TOTALS	118,478	2,641	380,086	501,205

TIMBER VOLUMES by SPECIES (National Forest)

	Million Cu. Ft. (7.0" to 8.9" d.b.h.)	Million Bd. Ft. (9.0" + d.b.h.)
Ponderosa pine	15	89
Douglas-fir	72,631	261,473
Spruce	4,441	65,131
Alpine fir	11,150	36,440
Lodgepole and limber pine	<u>55,575</u>	<u>82,705</u>
TOTAL VOLUME	143,812 MCF	445,838 MBF

Wood Product Production Facilities - The total lumber production for the project area is normally 1.2 million board feet annually. This is produced by two small mills, one of which operates sporadically and is presently inactive. Nearly all of the lumber produced is sold rough (green or dry) and the current price (March 1970) is \$85.00 per thousand board feet mill run. Sawmills at Livingston, Montana, and Cody, Wyoming, are the nearest production facilities outside the project area. This small export of raw material is compensated by similar volumes coming from the Crow Indian Reservation in Yellowstone and Big Horn counties.

All fence posts produced in the area are normally sold locally -- post dealers find it necessary to go outside the project for their supply of butt and full treated round posts or split cedar. Post production can be expanded as more material becomes available. One post plant in the area is hauling material up to 70 miles in order to keep operating. The most limiting factor in post manufacturing is the small acreage of lodgepole pine in the area.

The Timberweld Manufacturing Company at Columbus, Montana, is using Douglas-fir lumber shipped in from the west coast. High quality materials and drying equipment are essential to the satisfactory production of laminated beams they manufacture. This company employs more than 60 people and their market outlet is primarily the midwest.

WATER RESOURCES

- a. Surface Water - The Beartooth project area is drained by seven major streams and their tributaries. The main stem of the Yellowstone, Clarks Fork of the Yellowstone, Stillwater and Bighorn Rivers are the major streams. East and West Rosebud Creeks drain into the Stillwater River and Rock Creek drains into the Clarks Fork of the Yellowstone. These streams drain the southern portion of the project area. A considerable volume of water enters the planning area from the State of Wyoming in the Clarks Fork of the Yellowstone drainage. Most of the area lying north of the Yellowstone River is drained by small tributaries, such as White Beaver, Hensley and Valley Creeks. The extreme north portion of Stillwater County drains into the Musselshell River.

Most of the project area has an abundance of water during spring runoff. There is a need to shift the flow in terms of time so that more efficient use can be made of the water resource during the period of greatest need. Large volumes of water flow during May and June when the need for additional water is not at maximum. During August and September when stream flows have dwindled, there is a short supply to meet crop needs in some areas. Cooney Reservoir west of Boyd, Montana, on Red Lodge Creek is the major water storage facility in the project. It has a storage capacity of 27,400 acre feet of which 24,195 acre feet are used for irrigation. The remaining 3,200 acre feet are reserved for fish and recreation. Other storage sites in the project are: a small structure on the outlet of Glacier Lake, which drains into Rock Creek and provides 4,200 acre feet of water for late season use; a small reservoir on the Ernie Hudson ranch provides 64 acre feet of storage for irrigation, fishing and wildlife. Montana Power has a structure at Mystic Lake on West Rosebud Creek that provides 20,800 acre feet of storage for electrical power, fishing and recreation.

The number of suitable reservoir sites in the project area are limited. Small storage sites can be found on the Bluewater, Elbow, Valley and East Rosebud Creeks. Development of storage on these streams would materially increase the late season supply and provide adequate water for 127,000 acres now being irrigated. The mountainous region of the project area is the major source of high quality water and provides excellent fishing waters to the recreationist. On an average year, the main stem of the Yellowstone River will carry about 5,000,000 acre feet. Other drainage systems in the project area yield about 1,700,000 acre feet of water annually.

Stream flow measurements have been made at 31 stations within the project area over the past 58 years. The earliest measurements were made in 1905 on the Clarks Fork of the Yellowstone

River near Fromberg, Montana. The majority of these stations were operated for a short period of time -- less than 8 years. Many of the stations have broken records or were not in operation during periods of freezing weather when ice accumulations made measurements more difficult. In the following table is a listing of these 31 stations giving the associated U.S. Geological Survey station number (old and new) that identifies the record. Data in the table gives the period of time the record was kept, drainage area in square miles contributing to the flow, elevation of the measuring station, maximum peak discharge in cubic feet per second (cfs) and date of occurrence.

There are eleven gaging stations with sufficient length of record of develop frequency curves for peak discharge based on annual water yield. These stations have records ranging from 8 to 47 years and provide enough data to plot the peak discharge by return periods in percent chance of its probably occurrence that will be equal to or exceeded in the next 100 years. To illustrate: There is a 50 percent chance of having a peak discharge of 7,550 cfs on the Clarks Fork of the Yellowstone River at Edgar, Montana, and there is a 1 percent chance of having a peak discharge of 13,500 cfs at this same point. The Edgar station is the most downstream gaging point, indicating little additional runoff entering the system from the lower reaches of this stream. In contrast, Red Lodge Creek, where storage provided by Cooney Reservoir effects the flow, a maximum discharge of 3,120 cfs could be expected above the reservoir for a 1 percent chance and only 1,190 cfs below the dam. Peak discharge values have been calculated for cubic feet per second, per square mile (CSM) and the average annual yield in inches. The highest discharge value in CSM occurs on Blue-water Creek near Bridger in a drainage area of 28 square miles. Normally, discharge rates (CSM) increase as the drainage area decreases. The average annual water yield in inches varies from a low of 5.55 to a high of 22.6 and is shown under the 50 percent chance of occurrence. A water yield of 5.55 inches is equivalent to about 296 acre feet per square mile and is sufficient to irrigate about 95 acres. A water yield of 22.60 inches is equivalent to 1,205 acre feet and would irrigate 390 acres. (See Table 2).

TABLE 2. STREAM GAGE RECORDING STATIONS IN CARBON & STILLWATER COUNTIES, MONTANA

USGS STATION NOS.	STATION NAME		Period of Rec.	D. A. Sq. Mi.	Elevation Feet	Max. Dis. cfs	Date
	Old	New					
347 -	--	--	Stillwater River above Woodbine Creek, near Nye, Montana	160	5,120	6,520	6-27-27
348 -	--	--	Woodbine Creek near Nye, Montana	19	5,200	621	7- 9-26
349 -	--	--	Stillwater River near Nye, Montana	187	5,060	4,420	6-24-32
350 -	--	--	East Rosebud Creek at Roscoe, Montana	98	5,390	1,980	6-12-21
351 -	--	--	East Rosebud Creek at Roscoe, Montana	115	5,000	1,330	6-13-23
352 -	2040	--	Mystic Lake near Roscoe, Montana	46	--	--	---
-	2040.5	--	West Rosebud Creek near Roscoe, Montana	52	6,536	980	7-13-67
-	2043	--	Butcher Creek near Absarokee, Montana	40	4,200	441	6-16-62
*353 -	2045	--	Rosebud Creek near Absarokee, Montana	394	4,160	5,790	6-15-67
354 -	--	--	Rosebud Creek at Absarokee, Montana	401	4,030	4,750	6-16-11
*355 -	2050	--	Stillwater River near Absarokee, Montana	975	3,875	12,000	6-15-67
356 -	2055	--	Clarks Fork Yellowstone River above Squaw Creek, near Painter, Wyo.	194	6,480	4,970	6-22-50
357 -	2060	--	Clarks Fork Yellowstone River below Grandell Creek, near Painter, Wyo.	446	6,160	7,850	6- 4-57
*358 -	2065	--	Sunlight Creek near Painter, Wyo.	135	6,700	2,110	6-26-32
359 -	--	--	Clarks Fork Yellowstone River, near Clark, Wyo.	912	4,220	10,500	6-12-21
*360 -	2075	--	Clarks Fork Yellowstone River, at Chance, Montana	1,154	3,980	10,900	5-26-28
* -	2078	--	Bluewater Creek near Bridger, Montana	28	3,910	2,650	6-29-64
-	2079	--	Bluewater Creek at Fromberg, Montana	53	3,535	560	6- 9-64
361 -	--	--	Clarks Fork Yellowstone River at Fromberg, Montana	2,004	3,520	12,700	7- 3-09
*362 -	2085	--	Clarks Fork Yellowstone River at Edgar, Montana	2,032	3,440	10,900	6- 2-36
-	2090.1	--	Rock Creek below Glacier Lake, near Red Lodge, Montana	4	9,520	90	7-10-63
*363 -	2095	--	Rock Creek near Red Lodge, Montana	100	6,100	3,110	6- 4-57
364 -	2100	--	West Fork Rock Creek below Basin Creek, near Red Lodge, Montana	63	6,290	933	6- 6-52
*365 -	--	--	West Fork Rock Creek near Red Lodge, Montana	80	6,060	1,850	6-22-37
*366 -	2110	--	Red Lodge Creek above Cooney Reservoir, near Boyd, Montana	143	4,248	2,260	6-15-67
367 -	2115	--	Willow Creek near Boyd, Montana	53	4,260	1,720	6-15-67
368 -	2120	--	Cooney Reservoir near Boyd, Montana	206	--	--	---
*369 -	2125	--	Red Lodge Creek below Cooney Reservoir, near Boyd, Montana	210	4,140	3,590	6-17-57
370 -	--	--	Red Lodge Creek near Boyd, Montana	234	4,050	1,400	6- 8-32
*371 -	2135	--	Rock Creek at Joliet, Montana	539	3,780	1,930	6- 6-52
372 -	--	--	Rock Creek at Rockvale, Montana	550	3,470	2,310	6- 6-32

* Stations with sufficient record to develop frequency curves on water yields.

STREAM GAGE STATIONS - CARBON & STILLWATER COUNTIES, MONTANA, WITH SUFFICIENT RECORDS FOR DEVELOPMENT OF FREQUENCY CURVES

Stations USGS NOS. Old New	Drainage Area Sq. Mi.	Period of Record Years	Water Yield in Cubic Feet per Second			Water Yield in Cubic Feet per Second for each Sq. Mi.			Water Yield in Inches		
			Peak Discharge - cfs - vs % Chance 1/			Peak Discharge - CSM - vs % Chance 1/			Annual Yield - Inches - % Chance 1/		
			50%	20%	4%	50%	20%	4%	50%	20%	4%
353 - 2045	394	33	2/ 2400	3390	4900	5550	6200	12.44	14.09	15.74	13.90
355 - 2050	975	23	6400	8250	10800	11900	12900	8.60	8.46	8.36	12.35
358 - 2065	135	23	1130	1280	1450	1520	1590	11.08	11.21	11.78	12.35
360 - 2075	1154	47	7450	9000	11100	11900	12600	10.74	10.74	10.92	12.30
N/A - 2078	28	8	102	235	585	790	1040	7.80	10.31	10.92	10.55
362 - 2085	2032	46	7550	9400	11800	12600	13500	20.82	28.11	37.01	13.10
363 - 2095	100	34	1220	1710	2470	2780	3100	3.63	3.81	4.64	13.10
365 - N/A	80	10	625	950	1500	1730	2000	3.72	5.81	6.64	6.80
366 - 2110	143	32	493	960	1975	2500	3120	12.20	24.70	31.00	22.60
369 - 2125	210	30	445	610	920	1045	1190	11.88	18.75	21.63	26.55
371 - 2135	539	8	1310	1600	1990	2120	2275	6.71	13.81	17.48	10.45
								2.12	4.98	5.67	5.55
								2.43	3.69	4.22	6.10
											7.50
											9.25
											10.55
											21.95
											20.25
											21.95
											23.15
											20.60
											22.00
											19.00
											20.00
											15.40
											16.35
											14.20
											14.10
											10.95
											9.70
											10.25
											33.80
											35.50
											25.00
											28.20
											13.10
											14.60
											9.95
											10.55

1/ Percent chance is the probability the water yield in terms of cubic feet per second (cfs), cubic feet per square mile (CSM) and annual inches will be equal to or exceeded in a 100 year period.

2/ Example: The peak discharge of 2400 cfs of Rosebud Creek (at Station 2045) will be equalled or exceeded 50 times in the next 100 years.

- b. Ground Water - Availability of ground water in the two-county area is closely related to geologic events and changing conditions of environment associated with the development of the present physiography. The Yellowstone, Stillwater, Clarks Fork of the Yellowstone, East and West Rosebud and Rock Creek are important streams in the development of the ground water regimen in the two-county area. Of more significance were the events of the mountain-forming epoch, which began in mid-Tertiary time, some 30 to 40 million years ago. During this period of geologic time, a structural pattern developed in response to new stresses placed upon a system of ancient faults and fractures. (see geology and groundwater map)

The bedrock geology of an area has a pronounced effect on development of surface runoff and the seepage distribution of ground water. In the Pryor Mountain area of alternating dipping beds of sandstones and shales along the steep flank of the Pryor uplift, the less resistant shales host streams which flow down the strike of the valleys, while the sandstone hogbacks are cut by streams flowing down the dipslopes and joining the trunk drainages in the shale valleys. Large quantities of water are readily absorbed by sandstone as streams cross the outcrops. Reports indicate numerous streams and creeks disappear while running down the flank of the Pryor uplift; some streams reappear in the form of springs at the footslopes. Drainage patterns on the Beartooth plateau have developed in hard rock and they reflect topographic relief more than changes in lithology (rock-type). The numerous lakes in the Beartooth Mountains are accumulations of water in surface depressions caused by glaciation and many of them originated as a result of uplift whereby stream gradients were abruptly altered. Water flowing from the Beartooth Mountains supplies much of the perennial streamflow in the project area.

The Basin area of the project includes all of Carbon and Stillwater Counties between the Beartooth plateau and the flank of the Pryor Mountain uplift. The significant features of this area are the alluvium-filled valleys of major drainages and the gravel-capped terraces. Wells have been completed in the upper part of the Fort Union, but depths to aquifer has deterred development of the deeper bedrock aquifers.

Most of the water wells completed in alluvium are along the major drainage systems. The thickness of much of the alluvium on the floodplain is about 30 to 80 feet, however deeper pockets occur and most of the material is sand and gravel. Well-yields are mostly in the range of 5 to 50 gallons per minute (gpm), with several wells reporting 200 to 300 gpm and others commonly between 50 and 200 gpm. In some instances, shallow alluvial water is bypassed intentionally due to sand-flowage or unsuitable water quality. Water quality deterioration can occur when

soluble minerals or pollutants enter the aquifer. Small yields for domestic and livestock use can be developed from sandstone members of the bedrock aquifers. For more detailed description of these areas, see Montana Water Resources Board publication, "Groundwater Inventory for Carbon and Stillwater Counties."

- c. Feasible Watersheds - The Missouri River Basin Investigations revealed several potential PL-566 projects in the Beartooth RC&D project area. The following is a brief resume of those watersheds that have a favorable benefit-cost ratio (B:C ratio).
- (1) 14b-2 - Fishtail to Butcher Creek - 237,887 acres: 135,115 acres in Stillwater County and 102,772 acres in Carbon County. This watershed has 10 acres urban flooding, 1,670 acres with short late season supply and 1,536 additional potential irrigable lands. There is a need for late season storage plus ditch reorganization; estimated B:C ratio 1.6 to 1.0.
 - (2) 14b-3 - Lower Stillwater River - 133,522 acres: 126,321 acres in Stillwater County and 7,201 acres in Sweetgrass County. About 3,000 acres of irrigated cropland need improved diversions and ditch reorganization; estimated B:C ratio 1.6 to 1.0.
 - (3) 14b-4 - Shane, Beaver Creeks - 103,055 acres: 89,004 acres in Stillwater County and 14,051 acres in Carbon County. Flooding occurs on 460 acres of cropland, 150 acres are short of irrigation water, 750 acres of additional land could be irrigated if storage and distribution systems were provided; estimated B:C ratio 2.3 to 1.0. This project could be serviced as a group facility.
 - (4) 14c-6 - North Fork Cherry, South Fork Bridger, etc. - 169,815 acres in Carbon County. Improved distribution systems on existing irrigated acreage and provide water for 800 additional acres; estimated B:C ratio 5.2 to 1.0. This project could qualify as a group facility.
 - (5) 14c-7 - Grove Creek ... to Gold Creek - 151,749 acres in Carbon County. There are about 2,300 acres which need drainage, 3,100 acres need improved or reorganized irrigation systems, including canal lining. Some areas have a short supply for late season use. The estimated B:C ratio is 3.1 to 1.0 or 5.0 to 1.0 depending on each phase of the project.
 - (6) 14c-9 - Red Lodge Creek to Rock Creek - 201,530 acres in Carbon County. There are 80 acres of urban land and 4,000 acres of cropland or pastureland subject to flooding. Nearly 42,400 acres of cropland need improved irrigation

systems including laterals, 850 acres need drainage and some areas have a shortage of water for late season use. The estimated B:C ratio is 1.8 to 1.0. This does not include the recreational benefits from reservoir storage.

- (7) 14c-10 - Elbow Creek, Poverty Flat - 121,903 acres in Carbon County. There are 9,000 acres of irrigated land that could be improved with drainage or reorganization of irrigation systems. Estimated B:C ratio of 6.0 to 1.0. Another 3,343 acres need improved irrigation systems and 1600 acres of new land could be irrigated. Estimated B:C ratio of 2.07 to 1.0. There is an excellent potential for recreation on off-stream storage.
- (8) 14c-11 - Bluewater Creek - 102,575 acres in Carbon County. Water storage would provide flood control and water to irrigate 200 acres of new land, as well as water for both municipal and industrial use and excellent recreation. This project could qualify as a group facility.
- (9) 14-25 - Valley Creek - 74,547 acres in Stillwater County. This project will provide both flood prevention and recreation at an estimated B:C ratio of 1.1 to 1.0.
- (10) Part of 14-26 - Park City-Laurel Drain: Drainage only; acres remaining are unknown. There are also parts of two feasible watersheds in the Musselshell Drainage that would benefit Golden Valley County.

WILDLIFE

The wildlife resource of the project area is a major attraction for hunting, fishing and recreation enthusiasts. Habitat ranges from river bottoms to 11,000 foot alpine plateaus and annual precipitation varies from less than 6 inches to over 70 inches.

Big game animals include mule and white-tail deer, elk, moose, Bighorn sheep, bear, antelope and Rocky Mountain Goats. Rocky Mountain Goats are the only species not native to the area. They were successfully introduced in the early 1940's by the Montana Fish and Game Department. Bighorn sheep will be planted in the Pryor Mountains in the near future.

Much of the Beartooth Primitive Area is in the Custer National Forest and is included within the RC&D project area. While the primitive area is accessible only by horseback or hiking, many hunters, both local and out of state, take advantage of the early hunting seasons for deer and elk.

Hunter check stations and harvest surveys of the Montana Fish and Game Department indicates over 9,000 big game hunters go afield each season. The harvesting is in excess of 6,000 big game animals. Mule deer are most numerous, comprising about 95 percent of the total take. In descending order, the remaining 5 percent is composed of white-tail deer, antelope, elk, bear, Bighorn sheep and Rocky Mountain Goats. The rugged terrain of the Beartooth Mountains reduces the ability of the hunter to harvest surplus big game, particularly moose, Bighorn sheep and Rocky Mountain Goats.

The trout streams in the Beartooth area, particularly the Yellowstone and Stillwater, are known nationally for their high quality fishing. Other important fishing streams are the West Rosebud, East Rosebud, Rock Creek and the West Fork of the Stillwater. Many of the small creeks provide good fishing also. These waters have a variety of trout with the beautiful German brown and fighting rainbow leading the list. Native cutthroat and brook trout are more common in the high mountain lakes. A new water area of increasing importance to the angler is Bighorn Lake, a reservoir on the Bighorn River. This lake provides excellent fishing for walleye, rainbow trout and brown trout. In addition, perch, crappie, lake trout and largemouth bass are frequently caught.

Cooney Reservoir provides excellent fishing and is one of the most utilized rainbow trout waters in Montana. Other waters producing good catches of rainbow, brown and brook trout are East Rosebud, West Rosebud, Emerald and Mystic Lakes.

There are more than 400 mountain lakes on the 11,000 foot high Beartooth plateau, many of which are in the primitive area. These lakes provide a variety of excellent fishing for those willing to hike and enjoy the wonders of nature. Many lakes are accessible only by foot. Others can be reached by horse and some by four-wheel drive vehicle. Fishing is a challenge in these ice cold back country lakes and excellent catches of cutthroat, brook, rainbow and golden trout and grayling are only part of the reward of the energetic angler. This area currently is being studied for reclassification under the Wilderness Act of 1964.

Native upland game birds include the blue, ruffed, and sharp-tailed grouse. Introduced birds include the gray (Hungarian) partridge and chukar partridge, ring-necked pheasant and Merriam's turkey. Ring-neck pheasant accounts for more than half of the bird hunting in the project and are most abundant in farming areas. Sage grouse and sharp-tailed grouse furnish variety to hunting at lower elevations. Blue and ruffed grouse supply sporting pleasure in the high country.

Important waterfowl for hunting are mallards and Canada geese. Ducks nest and hatch in the Lake Basin area of northern Stillwater County. Nearby grain-fields furnish plentiful food supplies. Water and

shore conditions on the Yellowstone River are favorable to both ducks and geese. Boats and a good dog aid in a successful day's hunt.

Montana Fish and Game Department surveys indicate that over 10,000 upland game birds are bagged each year with ring-neck pheasant and gray Hungarian partridge comprising about 60 percent of the take. Sharp-tailed and sage grouse account for about 25 percent of the total bag. Waterfowl hunting yields 4,000 to 5,000 mallards and less than 100 geese annually.

Furbearing animals in the project include marten, mink, muskrat, otter and beaver. Predators include coyote, wolverine, mountain lion, weasel, skunk, bobcat, hawk and eagle. Non-game animals include rodents, raccoon, porcupine, squirrel, hare and rabbit. Mink, muskrat, and beaver are trapped along the major river courses.

RECREATION (see recreation map)

The recreation potential of the Beartooth project is almost limitless and this natural resource is virtually untouched. The challenge is ours to guide future development for the benefit of all. The Beartooth plateau in the Custer National Forest with its awe-inspiring beauty and 12,000 foot peaks cloaked in everlasting snow provide an indelible memory in the eyes of the beholder.

The city of Red Lodge, in southern Carbon County, is the anchor point to the 10,940 foot high Beartooth highway winding its way to scenic Cooke City and the northeast entrance to Yellowstone National Park. Each summer, during the height of the tourist season, Red Lodge hosts the famous week long Festival of Nations produced by the many nationalities in the area. Six miles to the west is the Red Lodge Mountain Ski Area. Its double chair lift provides skiers with a 2,000 foot lift and a ski run that thrills the best of them.

In the past, the Pryor Mountain area of eastern Carbon County has not been fully utilized because it was not easily accessible. Most of this area is publicly owned and administered by these Federal agencies -- U. S. Forest Service, Bureau of Land Management and National Park Service. The area has many camping and picnic facilities. Ice caves, limestone caverns, scenic overlooks, Indian vision quests and Crooked Creek canyon are some of the interest that will provide the tourist with memories never forgotten.

On the southern flank of Pryor Mountain is a wild horse range with observation points to view the behavior of this once domesticated animal. Bighorn Canyon National Recreation Area is the eastern border of the project. Its steep-walled canyon hundreds of feet deep was cut through by the Bighorn River, forming the Pryor Mountains to the west and the Bighorn Mountains to the east.

For the student of archeology, history and lore of the old west, the Pryors are replete with information and historic sites. Studies indicate the area was inhabited by man more than 9,000 years ago. Captains Lewis and Clark travelled through the region as did Chief Joseph when he eluded the U. S. Army.

Use of the Pryor region as shown by statistics indicate the Bighorn Canyon National Recreation Area has 500,000 visitor days, the U. S. National Forest estimates 160,000 visitor days and the Bureau of Land Management forecasts 90,000 visitor days.

Crossing the Beartooth RC&D project area from east to west is the Yellowstone State Recreational Waterway -- a part of the State Recreational Waterway System. Special emphasis is given by all agencies to the recreation, wildlife and historic resources of the Yellowstone River.

Some of the finest recreation areas in the nation are located near Rosebud Creek on the Stillwater River, in western Stillwater County. Here one can enjoy complete solitude and the grandeur of wilderness as he camps, fishes and hikes in this scenic wonderland.

Snow survey data indicate there are good potentials for a variety of winter sports. Adequate snowfall areas for skiing and snowmobiling are delineated on the recreation map.

Ski areas - For early season snow, ski developments in Carbon and Stillwater Counties should have base facilities at an elevation of 8,000 feet or above. Slopes facing the Yellowstone valley should be avoided since they do not receive adequate early season snowfall.

The most promising area for ski facilities and snowmobiling is Basin Creek-Silver Run area on the West Fork of Rock Creek. In this region there are relatively flat areas for base facilities near 8,000 feet elevation. There also appear to be bowls that would provide a variety of ski slopes from beginner to expert. Early season snowfall would be adequate most years at this elevation. However, with the area facing northeast, early season snow measurements should be made prior to costly development. Construction of a road from the West Fork road to the base facilities would be necessary.

The Basin Creek-Silver Run area appears to have possibilities for a rather large development. With an overall plan, development could proceed over a period of years.

Helicopter lifts for skiing is becoming more popular and may be feasible in the Beartooth area. There is considerable terrain adaptable to this type of access outside the boundaries of the primitive areas.

Snowmobile trails - Although there is adequate snow over most of the mountain area. Much of the terrain is unsuited for snowmobile travel because of steep slopes. Areas that deserve investigation are:

- 1 - Stillwater River Route to Cooke City
- 2 - Rock Creek, and Lake Fork of Rock Creek
- 3 - West Fork of Rock Creek including Silver Run Creek,
Basin Creek, Quinnebaugh Meadows and Silver Run
Plateau
- 4 - The mountain front from Line Creek through Red Lodge
to Nye
- 5 - Pryor Mountain Area

Developed trails in the project should not be located below 6,000 feet elevation because of questionable amount of snow. Deeper snow pack at higher elevations are preferable to avoid areas of bare ground caused by mid-winter melt. Snowmobile rallies and parties can be held in lower elevations when snowfall is adequate. Conflict with private land uses need to be resolved. Trails should avoid critical big game wintering areas (see recreation map).

Many recreation resources are under-developed and need careful planning for the benefit of all. The Beartooth RC&D recreation map shows an inventory of existing developments on public and private lands. Agency committees have made an inventory of income producing recreation potential for twelve categories. This information has been published and is available at the Soil Conservation Service offices in Joliet and Columbus.

C. ECONOMIC and SOCIAL DATA

AGRICULTURE and RELATED LAND USE

Agriculture, being the leading industry in the project area, can best be demonstrated by the following comparison. In 1959, the aggregate income of the population in Carbon County was about \$11 million, of which \$7,969,000 was from the sale of farm products. In Stillwater County, the aggregate income was about \$8 million, of which \$6,978,000 was from the sale of farm products. A further breakdown in sales from commercial farms in 1964 is shown in Table 3. Livestock numbers are shown in Table 4 and crop acreages are shown in Table 5.

It is interesting to note that in 1964, more than 63 percent of the farm products sold by commercial farms was from the sale of livestock. During a 5-year period from 1959 to 1964, the number of cattle and calves increased about 16 percent. During this same period, the number of dairy cattle fell sharply and decreased more than 29 percent. The number of hogs showed a slight increase, while sheep and lambs numbers decreased more than 25 percent.

TABLE 3 - FARM PRODUCT SALES by COMMERCIAL FARMS ^{1/}

Item	Carbon County	Stillwater County	Total
All Farm Products	\$8,145,161	\$6,749,113	\$14,894,274
All Crops	2,874,196	2,574,731	5,448,927
All Livestock	5,265,959	4,160,130	9,426,089

^{1/} Census Definition 1964 Census of Agriculture (Data not additive)

TABLE 4 - LIVESTOCK NUMBERS 1959 and 1964 ^{2/}

	All Cattle & Calves	Dairy Cows	Hogs & Pigs	Sheep & Lambs	Chickens
Carbon County					
1959	49,188	2,997	7,015	60,999	40,446
1964	61,894	2,216	7,768	51,499	25,453
Stillwater County					
1959	45,739	1,595	5,911	35,998	26,591
1964	51,260	1,046	6,407	21,129	16,206
Total					
1959	94,927	4,592	12,926	96,997	67,037
1964	113,154	3,262	14,175	72,628	41,659

^{2/} Census of Agriculture 1959 and 1964

TABLE 5 - LAND USE of INVENTORIED ACREAGE - PRIVATE and STATE LANDS
Based on 1967 Conservation Needs Inventory

Land Use - Acres	Carbon	Stillwater	Total	
Corn	2,082	1,400	3,482	
Sugar Beets (1969)	7,546	1,252	8,798	
All other row crops	6,701	398	7,099	
Small grain	48,858	92,935	141,793	
Summer fallow	32,214	91,500	125,714	
Rotation Hayland & Pasture	4,000	14,800	18,800	
Hayland	70,987	30,000	100,987	
Conservation use only	4,066	2,743	6,809	
Temporary idle land	500	2,000	2,500	
Orchards	320	50	370	
Abandoned cropland	--	10,000	10,000	
TOTAL cropland	179,274	247,078	426,352	- 24%
Pasture land	19,704	14,681	34,385	
Range land	539,074	610,785	1,149,859	
TOTAL pasture and range	558,778	625,466	1,184,244	- 69%
Commercial woodland	28,623	39,916	68,539	
Non-commercial woodland	13,971	28,556	42,527	
TOTAL woodland	42,594	68,472	111,066	- 6%
Other land (in farms)	8,400	2,735	11,135	
Other land (not in farms)	1,903	2,140	4,043	
TOTAL other	10,303	4,875	15,178	- 1%
TOTAL	790,949	945,891	1,736,840	- 100%

TABLE 6

ACREAGE by LAND CAPABILITY CLASS and SUB-CLASS for PRIVATE and STATE OWNED LAND

CONSERVATION NEEDS INVENTORY

Land Class & Sub-Class	Cropland		Pasture		Range	Woodland	Other	Total
	Irrigated	Dry	Irrigated	Dry				
Class I	15,964	0	1,003	0	0	0	0	16,967
Class IIe	2,000	8,303	1,500	0	6,524	0	0	18,327
IIw	7,397	0	2,012	201	807	0	469	10,886
IIs	2,944	500	38	0	0	240	0	3,722
IIc	35,215	17,127	2,855	204	24,530	0	2,099	82,030
Total	47,556	25,930	6,405	405	31,861	240	2,568	114,965
Class IIIe	24,475	159,317	3,418	390	153,104	891	1,868	343,463
IIIw	3,942	0	208	88	237	0	50	4,525
IIIs	760	0	3,206	301	5,147	0	100	9,514
IIIC	0	41,411	0	251	42,750	6,703	2,419	93,534
Total	29,177	200,728	6,832	1,030	201,238	7,594	4,437	451,036
Class IVe	9,429	61,385	1,931	55	97,559	0	2,421	172,780
IVw	5,814	0	687	0	0	0	0	6,501
IVs	953	500	464	57	893	0	121	2,988
Total	16,196	61,885	3,082	112	98,452	0	2,542	182,269
Class Vw	0	0	116	0	0	0	0	116
Class VIe	805	9,102	72	2,681	461,156	36,011	1,277	511,104
VIw	0	0	0	8,011	22,639	0	891	31,541
VIIs	0	19,009	0	494	53,965	24,190	3,252	100,910
Total	805	28,111	188	11,186	537,760	60,201	5,420	643,671
Class VIIe	0	0	0	0	219,973	18,220	50	238,243
VIIIs	0	0	0	4,142	36,395	24,311	161	65,009
Total	0	0	0	4,142	256,368	42,531	211	303,252
Class VIIIs	0	0	0	0	24,180	500	0	24,680
Total	109,698	316,654	17,510	16,875	1,149,859	111,066	15,178	1,736,840

The land capability class groups soils into eight suitability groups for agricultural use. The severity of the limitations and hazards increase with each land class.

- Class I - Few limitations for cropland use.
- Class II - Moderate limitations for cropland use.
- Class III - Severe limitations for cropland use.
- Class IV - Very severe limitations for cropland use.
- Class V - Not suitable for cultivation and has only slight limitations for pasture, range, woodland and wildlife.
- Class VI - Severe limitations that make them unsuitable for cropland and limit their use to pasture, range, woodland and wildlife.
- Class VII - Very severe limitations that make them unsuitable for cropland and restrict their use to grazing, woodland and wildlife.
- Class VIII - Such severe restrictions that it precludes its use for commercial plant production for harvest other than wildlife.

Sub-class letters denote the major kind of problem related to each land class.

- e - Erosion susceptibility is the dominant problem.
- w - Excess water - wetness due to poor drainage or overflow.
- s - Soil depth or texture limiting root zone development.
- c - Climate - limited growing season or lack of moisture reducing the choice of crops.

TABLE 7 - AVERAGE YIELDS of CULTIVATED CROPS
BASED on 1967 HARVESTED ACRES ^{1/}

Crop	Carbon		Stillwater		Project Area	
	Dry	Irr.	Dry	Irr.	Dry	Irr.
Winter wheat	32 bu.	52 bu.	34 bu.	60 bu.	33 bu.	56 bu.
Spring wheat	27 bu.	36 bu.	18 bu.	38 bu.	23 bu.	37 bu.
Barley	42 bu.	57 bu.	31 bu.	52 bu.	37 bu.	55 bu.
Oats	46 bu.	71 bu.	38 bu.	63 bu.	42 bu.	67 bu.
Corn silage	--	23 T.	--	20 T.	--	21.5 T.
Alfalfa hay	1.5 T.	2.8 T.	1.5 T.	2.4 T.	1.5 T.	2.6 T.
Sugar beets	--	17.0 T.	--	19.3 T.	--	18.2 T.
Dry beans	--	1850 lbs.	--	1730 lbs.	--	1790 lbs.

^{1/} Data from Montana Agricultural Statistics.

TABLE 8 - COST and RETURN STUDY - PRIVATE LANDS

Based on estimates and local ranchers' experience and figures, the costs and net returns per year from privately owned rangeland in Stillwater and Carbon Counties are as follows: (these are conservative broad estimates).

Carbon & Stillwater Counties	Fair Range Condition		Good Range	Total Present Estimated Cost and Return	Potential Returns
	Over-	Properly	Condition		
	stocked	Stocked	Properly Stocked		
	^{1/}	^{2/}	^{3/}		^{4/}
Calf Crop %	70%	85%	90%		90%
Average wean- ing weights	325#	410#			410#
Winter feed period	5 mo.	4 mo.	3 mo.		
Gross Income from Beef	\$1,096,818	\$1,137,578	\$2,060,984	\$4,295,380	\$4,836,598
Annual Range- land Costs	\$ 73,332	\$ 138,761	\$ 168,648	\$ 380,741	\$ 395,704
Annual Live- stock Costs	\$1,080,647	\$ 681,895	\$ 951,830	\$2,714,372	\$2,048,877
Net Return	\$ -57,161	\$ +316,922	\$ +940,506	\$1,200,267	\$2,392,017

^{1/} Constitutes 25% of total rangeland area

^{2/} Constitutes 35% of total rangeland area

^{3/} Constitutes 40% of total rangeland area

^{4/} Estimated potential after range is in good condition and properly stocked.

FARM SIZE, TENURE and ECONOMIC DISTRIBUTION

Cost and return studies of irrigated crops in Carbon, Stillwater and Yellowstone Counties have recently been completed by the Cooperative Extension Service.

The information regarding the costs of growing irrigated crops in this study was based on average conditions for the area. Yield and efficiency in operations were for the upper one-third of management. Although these estimates can vary widely between farms and ranches, certain conclusions can be drawn from the study.

During the past 10 to 15 years, farms costs have continuously increased while gross returns received for farm products have increased very little. Net return to the farmer has steadily declined.

This small margin of profit will vary between enterprises and size of farm unit. Some farm enterprises have a reasonably large margin of return when expanded to certain levels of production while others show a negative return. In many cases one enterprise is being supported by another without the manager realizing it.

These situations have caused many changes in agricultural needs. A more complete farm record keeping system will show many farm enterprises not paying their way. Many diversified operations could use a computerized farm account system with enterprise cost accounting.

Studies show the majority of farms are not receiving a 6 percent return on their investment for land and operating capital. Last year land values in Montana increased about 4 percent. This was beneficial to established farm operators, since it increased their net worth and gave them greater borrowing power. On the other hand, rapidly increasing land values have almost eliminated the possibility for young men to become established in farming. The trend is to larger and fewer farms in the area.

Productivity is partially indicated in the distribution by economic class and the high incidence of off farm employment. Assuming it takes \$10 or more of sales to return a net disposable income of \$3, all farms in the economic classes IV, V and VI are poverty farms. In Carbon County, this comprises 60.4 percent of the farms and in Stillwater County, it comprises 45.4 percent in 1964. It must be pointed out that about one-third of the farm operators in the area rely on significant amounts of non-farm income. See Table 9.

TABLE 9 - FARM SIZE, TENURE and ECONOMIC CLASS DISTRIBUTION

	<u>Carbon</u>	<u>Stillwater</u>	<u>Totals</u>
Farms - Number	749	489	1,238
Approx. Land Area - Acres	1,324,800	1,150,080	2,474,880
Proportion in Farms - Percent	51	78	
Land in Farms - Acres	672,956	896,349	1,569,305
Aver. Size of Farms - Acres	898	1,833	
Value of Land and Buildings:			
Per Farm	64,450	100,950	
Per Acre	73	55	
Cropland Harvested	101,224	117,844	219,068
Irrigated and Pasture Crops	96,363	30,845	127,208
Farms by Size:			
260-499 acres	163	66	229
500-999 acres	133	85	218
1000-more acres	164	227	391
Farm Operators:			
Full owners	420	209	629
Part owners	215	218	433
Managers	--	6	6
All Tenants	144	56	200
Aver. age of all Farm Operators	50	50	
Farm Operators over 65	89	79	168
<u>FARMS by ECONOMIC CLASS</u>	654	421	1,075
Class I, sales \$40,000 or more	26	28	54
Class II, \$20,000-\$39,999	67	70	137
Class III, \$10,000-\$19,999	166	132	298
Class IV, \$5,000-\$9,999	225	97	322
Class V, \$2,500-\$4,999	123	66	189
Class VI, \$50-\$2,4999	47	28	75
Percent Class IV and below	60	45	
Part-time Operators	54	33	87
Part Retirement	41	35	76
Worked off of Farm 100 days or more	117	73	190

Source: Census of Agriculture
Developed by Extension Service

The ever increasing cost of machinery and equipment has raised the fixed costs of ownership of many implements to a point that they must be used continually during the summer months to make their ownership feasible. If this trend continues, there will be more custom work done in the area.

The cost return study indicates a farm operator must achieve a very high yield to realize a net profit on most crops grown in the area.

There is indication that some of the long time irrigated crops grown in the area show very low net return as compared to some other crops. Changes in some cropping systems will have an effect on markets and processing facilities of the area.

MARKET ACCESSIBILITY and TRANSPORTATION

Three important highways traverse the area: Interstate 90, a transcontinental highway following the Yellowstone River valley; U. S. 310, following the Clarks Fork River, entering Wyoming near Warren; and U. S. 212 following Rock Creek through Red Lodge, crossing the Beartooth Mountains at an elevation of 10,940 feet near the northeast entrance to Yellowstone National Park. This highway is one of the most scenic and spectacular in the United States and visitors of Yellowstone National Park should not miss it.

Railroad freight service is provided by the Burlington Northern Railroad in Stillwater County and parts of Carbon County. The only passenger service depot is at Columbus. Daily bus service is available from the larger towns. No commercial airlines operate in either county. There are community airports at Red Lodge, Bridger and Columbus. The runways are insufficient for commercial aircraft larger than DC-3s. Regular commercial flights are available at the Billings airport about 35 miles from Joliet. A few ranchers have their own landing strips and many others could provide this service should the need arise.

There are ample grain market facilities in the area. There is a sugar refinery at Billings plus two meat packing plants and a live-stock terminal.

PUBLIC FACILITIES

There are seven small high schools in Carbon County and five in Stillwater County. Some consolidation for better quality education is indicated, but as yet no workable or acceptable approach has been presented. The analyst must be cautious in realizing the investments in existing physical school plants is a committed investment and consolidation will require new investments. The counties in general have a good network of surfaced and all-weather roads so bus routes are feasible.

There is an ample supply and distribution of natural gas to most towns in the area and to some farms enroute. Electricity is distributed by the Montana Power Company and the Beartooth Rural Electric Cooperative. Nearly all farms have telephone service. Some towns lack municipal water. Many of the towns do not have municipal sewage disposal.

POPULATION

During the past 10 years, population has declined 17 percent in the project area. Preliminary census data for 1970 shows Carbon County lost 1,322 people and Stillwater County lost 1,019, making a total out-migration of 2,341 people.

	<u>1960</u>	<u>1970*</u>	<u>Loss</u>	<u>Percent</u>
Carbon	8,317	6,995	— 1322	16%
Stillwater	<u>5,526</u>	<u>4,507</u>	— <u>1019</u>	<u>18%</u>
TOTAL	13,843	11,502	— 2341	17%

Both counties have shown a decline in population for more than 40 years.

* Preliminary 1970 Census Data

Various communities show the following population based on the 1960 census. Preliminary 1970 census data for towns is not available at this time.

<u>Carbon Co.</u>		<u>Stillwater Co.</u>	
Red Lodge*	2,230	Columbus*	1,281
Bridger*	724	Absarokee	600
Joliet*	392	Park City	350
Fromberg*	367	Rapelje	100
Belfry	194	Reedpoint	100
Roberts	194	Fishtail	80
Edgar	115	Nye	75
Bearcreek*	63	Molt	20
Silesia	<u>57</u>		
	4,336		<u>2,606</u>

* Incorporated towns

The entire area is classed as rural by the census criteria because no community has over 2,500 people.

Population density in 1960 was 4 persons per square mile in Carbon County and 3 persons per square mile in Stillwater County. The average densities are misleading in that most of the population is concentrated along the irrigated valleys.

During the decade, 1950-1960, Carbon County experienced a natural increase of births over deaths of 6 percent, but during that same time had a net out-migration of 24.7 percent that resulted in a net population loss of 18.8 percent. During this same decade Stillwater County experienced a natural increase of 13.2 percent and net out-migration of 11.2 percent resulting in a net gain in population of 2.0 percent. Much of the net out-migration in both counties was the younger, better trained families seeking more gainful employment.

Closing the coal mines and technological changes in agriculture leading to declines in agricultural employment were the contributing factors to population loss.

The 1960 levels of education and age characteristics in the project area as compared to State of Montana as a whole are as follows:

	<u>Carbon County</u>	<u>Stillwater County</u>	<u>State of Montana</u>
<u>Persons 25 yrs. & older</u>			
Median yrs. of schooling	10.2	10.7	11.6
Percent with less than 5 yrs. of schooling	7.2	3.7	4.1
Percent completed high school or more	40.6	41.7	47.8
Persons over 65 yrs.	15.0%	11.9%	9.7%

Statistics show the age level in the area is significantly older than the rest of the state and the percent completing high school is about 7 percent below the state average.

EMPLOYMENT

The Beartooth area is dominantly agricultural. Over one-third of the labor force is directly employed in agriculture and a large portion is engaged in service to agriculture. The distribution of employment in the area is shown in the following table.

The greatest changes in employment from 1950-1967 were agriculture and mining as reflected in the following table for Carbon County. Similar information has not been completed for Stillwater County.

TABLE 10 - EMPLOYMENT CHANGE in CARBON COUNTY*

	<u>1950*</u>	<u>1960*</u>	<u>Est. 1967</u>	<u>Employment Change</u>	
				<u>1950-60</u>	<u>Est. 1960-67</u>
Non-Agricultural Employment	1,794	1,832	1,921	38	89
Mining	175	41	41	-134	0
Construction	171	205	219	34	14
Manufacturing	73	113	120	40	7
Trans., Commu., Util. (including railroads)	176	209	212	33	3
Wholesale, Retail Trade	541	522	538	-19	16
F.I.P.E.	40	69	76	29	7
Services	515	537	565	22	28
Government	103	136	150	33	14
Agricultural	1,676	954	830	-722	-124
Industry Not Reported	72	154	105	82	-49
TOTAL EMPLOYMENT	3,027	2,940	2,856	-602	-84

* Source: Comprehensive Area Water & Sewer Plan for Carbon County.

**TABLE 11 - EMPLOYMENT CHANGE by MAJOR INDUSTRY GROUP
in STILLWATER COUNTY (1950-1960-1969)**

<u>Industry Groups</u>	<u>Labor Force</u>		
	<u>1950</u>	<u>1960</u>	<u>1969**</u>
Agriculture	1,089	691	NA*
Forestry and Fisheries	3	4	NA
Mining	37	187	1
Construction	95	93	20
Manufacturing	35	86	65
Transportation and Utilities	125	158	13
Trade	241	265	158
Services and Finance	274	332	NA
Government	63	52	NA
TOTAL	1,962	1,868	NA

* Not Available

** Board of Equalization
State of Montana

Source: U. S. Bureau of Census

TABLE 12 - INDUSTRY GROUP of EMPLOYED*

	<u>Carbon</u>	<u>Stillwater</u>	<u>Total</u>
Agriculture	945	691	1,636
Forestry & Fisheries	9	4	13
Mining	41	187	228
Construction	205	93	298
Manufacturing	113	86	199
Transportation Express Services & Warehousing	130	101	231
Communications	32	35	67
Utilities & Sanitary Service	47	22	69
Wholesale Trade	46	18	64
Retail Trade	476	247	723
Finance, Insurance & Real Estate	69	35	104
Business Services	4	4	8
Repair Services	50	16	66
Private Household & Personal Services	123	69	192
Entertainment & Recreation Services	38	4	42
Hospitals	56	24	80
Educational Services	224	139	363
Public Administration	136	52	188
Miscellaneous	196	139	335
TOTALS	2,940	1,966	4,906
Percentage of Women in Labor Forces	26	26	
Worked Outside of County	197	144	341

* Source: U. S. Census of Population - 1960
Developed by Extension Service

Immobility in the remaining labor force, made up in large part by older people, has some influence on the chronic unemployment shown in the following table:

TABLE 13 - EMPLOYMENT, UNEMPLOYMENT and LABOR FORCE

	Average Monthly Total <u>Employment</u>	Total <u>Unemployment</u>	Average Monthly Total <u>Labor Force*</u>	Average Monthly Unemployment Rate
<u>Carbon</u>				
1960	2,920	203	3,123	6.51
1961	2,796	247	3,043	8.12
1962	2,964	179	3,143	5.70
1963	3,108	186	3,294	5.65
1964	3,062	165	3,227	5.11
1965	3,154	158	3,312	4.78
1966	3,062	137	3,199	4.28
<u>Stillwater</u>				
1960	1,062	22	1,084	2.00
1961	968	19	987	2.00
1962	700	30	730	4.00
1963	662	28	690	4.00
1964	662	25	687	4.00
1965	640	21	661	3.00
1966	680	12	692	2.00
1967	704	14	718	2.00
1968	760	8	768	1.00

Source: Unemployment Compensation Commission - State of Montana

INCOME

Using criterion of \$3,000 income per family per year as the definition of poverty, we find 998 out of 3,678 families in the area in 1960 were living in poverty. Over 27 percent were in serious difficulty. Most families with less than \$4,000 income per year spend virtually all of their income on the necessities of food, clothing, shelter, transportation and medical care. In this area 1,535 families or 41.7 percent are in this category. The median family income in Carbon County was \$4,336 and for Stillwater County was \$4,790 as compared to \$5,403 for Montana.

There were 198 recipients of public assistance in Carbon County and 81 recipients in Stillwater County. Further examination reveals that only 233 families in the entire two-county area had incomes of over \$10,000 per year. The distribution of families by levels of income is shown on the following table.

TABLE 14 - GENERAL SOCIAL and ECONOMIC CHARACTERISTICS*

Family Income for 1959 - All Families

<u>Total Family Income</u>	<u>Carbon</u>	<u>Stillwater</u>	<u>Total</u>
Under \$1,000	206	65	271
1 - 1,999	216	140	356
2 - 2,999	252	119	371
3 - 3,999	326	211	537
4 - 4,999	329	245	574
5 - 5,999	323	192	515
6 - 6,999	189	178	367
7 - 7,999	115	79	194
8 - 8,999	86	82	168
9 - 9,999	54	38	92
10 & over	<u>125</u>	<u>108</u>	<u>233</u>
TOTALS	2,221	1,457	3,678
Median Income	\$4,336	\$4,790	
Public Assistance Recipients	198	81	279

* Source: U. S. Census of Population
Developed by Extension Service

POLLUTION

Compared with populated areas, the Beartooth RC&D Project enjoys a pollution free environment. By Montana State Department of Health standards, the area is relatively clean.

The environment in the Beartooth area like other areas is subject to contamination from a variety of chemical and physical pollutants. However, these pollutants were not classed as such until the quality of the environment becomes endangered.

Air pollution is present in the project area when agricultural residues, garbage and oil sump wastes are burned. Wind erosion contributes to airborne sediment in the atmosphere wherever soil is not adequately protected.

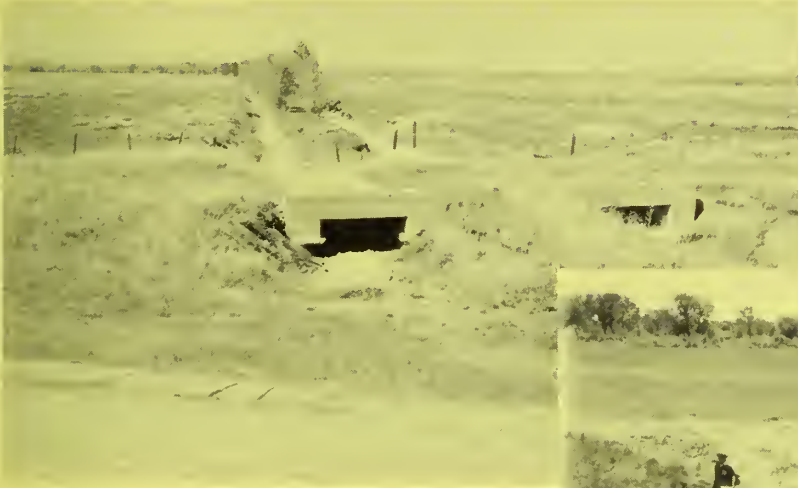
Water pollution has a variety of sources. Human contamination comes primarily from inadequate residential sewage treatment. Livestock and insecticides contribute to agricultural pollution of streams, lakes and reservoirs. Sedimentation arising from geologic erosion as well as improper land use lowers water quality and fills natural and constructed water storage facilities.

Laboratory examinations indicate most of the streams in the area have measurable contamination, the bulk of which is from sediment. Evidence of sewage pollutants has been detected in several of the streams passing through communities and residential areas.

Potential water pollution exists throughout the area. Some communities are developing an overload on their sewage systems. Mining operations are on the upswing and could be a possible source of chemical and sediment pollutants. Additional feedlots proposed for the area will require proper location and installation to keep pollutants at an acceptable level.

Carbon and Stillwater Counties have employed a two-county sanitarian. His responsibility is to determine that Montana State Board of Health standards are observed.

PROBLEMS and OPPORTUNITIES



Parallel ditches reduce irrigation efficiency.



Combining, rebuilding and lining ditches increase efficiency.



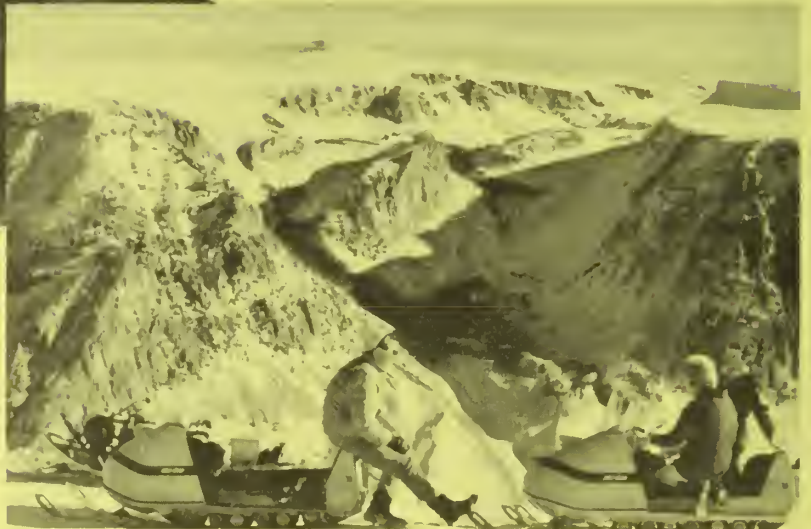
Flooding of railroad tracks, highway and town after a high intensity storm.



Installing a pipeline to deliver irrigation water down a sloping field.



Fireman's Point fishing
access to the Stillwater
River. F&G photo



Snowmobiling in the
Beartooth Mountains.
Waples' photo

River floating is gaining
in popularity.



Sanitary land fills are
needed in many communities.

SECTION III

PROBLEMS and OPPORTUNITIES

In resource planning and development, often the apparent problems are not the real problem but rather symptoms of several related problems. Each must be identified and dealt with in a manner that will treat the symptom and effect a cure. For example, a water shortage during the late irrigation season will point up a need for additional storage to be held for late season use. The storage must come during the early season when a surplus of water exceeds the demands. Such storage could also prevent flood damage and result in multiple benefits. In this section the problems relate to each major resource, and the opportunities which follow list several suggested ways in solving these problems.

There is an ever pressing need for state and federal agencies to develop and carry on a strong educational and information program dealing with proper land use and water management as they relate to total resource development.

A. CROPLAND RESOURCES

1. Problems

Conservation needs study of the cropland resource indicates there are a number of problems that limit production and net income of the rural people in the area. There are several interrelated problems dealing with cropland use and their combination results in the following kinds of problems.

- a. Irrigated cropland comprises 109,698 acres. It is used for the production of hay, small grain, sugar beets, beans, and potatoes. Farming costs are high and production is below the potential.
 - (1) Nearly 80 percent of the irrigated cropland needs improved irrigation systems for better water control and increased yields.
 - (2) About 14,000 acres of land adequately irrigated need improved cultural management to increase yields.
 - (3) Nearly 3,500 acres with adequate irrigation systems need improved management.
 - (4) Irrigated farm units are small and often irregular in pattern.
 - (5) Much of the fertilizer being used is lost through wasteful use of water.

- (6) Hay production is low because of old depleted stands and low fertility.
 - (7) Fertilizer use on much of the irrigated cropland has been too limited.
 - (8) High cost of farm machinery and small acreage increase overhead and reduce net income.
 - (9) Seepage from wasteful irrigation has affected nearly 20,000 acres of cropland. Saline and alkaline conditions are increasing.
 - (10) High labor cost and lack of trained irrigators reduce irrigation water efficiency and crop yields.
 - (11) Soil erosion resulting from runoff during irrigation increases the sediment pollution in any return flow.
 - (12) Gully erosion has resulted from the careless waste of unused irrigation water.
 - (13) Farming operations have not kept pace with new technology and management skills.
 - (14) Weed problems have decreased yields and farm income, the extent and cost of control increases each year, and the noxious weed problem is more extensive on the irrigated acreage. Leafy spurge, Canada thistle, Perennial Sowthistle, Whitetop, Spotted knapweed, Common toadflax, Dalmation toadflax and Russian knapweed are all in need of control.
 - (15) Inflated land values are too far above the returns that can be expected from cropland use.
- b. Dry cropland in the project comprises 316,654 acres. It is used primarily for the production of small grain in a crop-fallow rotation. Hay is produced on a relatively small acreage. Net farm income has declined. Farm machinery and labor costs have increased, and the production is limited to available moisture. Erosion on fallow land is a problem.
- (1) Wind stripcropping is needed on 40,000 acres for erosion control.
 - (2) Better crop residue management is needed on 90,000 acres.

- (3) Hay stands can be improved on 14,000 acres with renovation or re-establishment.
- (4) Grain production on Class VI land is generally not feasible due to low yields and high risks in land damage.
- (5) Some areas that are underlain by shale or fine clay are developing a seeped saline condition that is reducing yields under a small grain-fallow system of farming.

2. Opportunities

- aa. The opportunities for improving the effective use of irrigation water and increasing yield on irrigated cropland to achieve higher net income can be done with the following kinds of activities:
 - (1) Reorganize irrigation systems on nearly 86,000 acres using adapted methods that will improve efficiency and reduce labor costs. Sprinkler irrigation, border dikes, corrugation and contour methods are all applicable when properly planned and designed for kind of soil, type of crop and land form.
 - (2) Well-planned systems of crop rotations and cultural management practices will increase yeilds and reduce weed problems.
 - (3) With basic soil data well-trained irrigators can manage water to meet crop needs without excess loss in terms of runoff or deep percolation.
 - (4) Encourage consolidation of small farm units to avoid irregular shaped fields that are more costly to irrigate.
 - (5) Make needed shifts in types of farm enterprises that will provide a higher net return. Considerations should be given to feeder operations, dairying, swine and poultry. Recreation benefits on irrigated lands should not be overlooked.
 - (6) Fertilizer use on irrigated cropland will increase yields when applied at recommended rates.
 - (7) Soil and climate are favorable in the area for increased seed production. Montana uses approximately 500,000 pounds of grass seed annually; much of this can be produced in the area. Processing and marketing should be expanded.

- (8) Farm organizations could provide rentals of high cost machinery to the small operator who cannot afford to own the equipment needed.
- (9) More custom work should be done on the small unit when it is not economical to own the needed equipment.
- (10) Improved irrigation systems will reduce seepage and increase yields. Group drainage will more effectively restore wet lands to high productive use.
- (11) Saline-alkaline areas can be improved only when adequately drained and leaching provided. Soil amendments will usually speed up the process. Some areas are better suited to wildlife.
- (12) Structural measures will reduce land damage where unused irrigation water is returned to natural flows.
- (13) Information and training programs will help keep the rural people informed on new technology, management skills, market facilities and new or improved plant species.
- (14) County-wide weed districts should organize and carry out vigorous weed control programs. Farmers should always use high quality certified seed that is free of weeds. Mechanical methods of control should be used whenever possible.
- (15) By keeping accurate farm records and budgets one can determine which type of farm operation is giving the best return on his investment. This will lead to more efficient operation and a higher net return.
- (16) Marketing associations could provide ready markets and usually higher prices for all farm products. Feasibility studies will point the way for additional market outlets.
- (17) Acceleration of soil surveys in Stillwater County will provide basic information for land use planning. Professional planners, farmers, engineers and city folks can all benefit by knowing the soil, its limitations and its best use.
- (18) All land owners should develop a basic conservation plan to better utilize and protect their soil and water resources.

bb. Erosion control practices on dry cropland will reduce soil loss and increase yields.

- (1) Under a fallow system of farming stubble mulch and/or stripcropping is usually adequate to control erosion.
- (2) Grassed waterways on natural drainages prevents gully erosion and sediment damage to both land and water.
- (3) Renovation, fertilization, or re-establishment of hayland will increase yield and reduce the weed problem.
- (4) Hay or pasture seeding will reduce erosion damage or more than 26,000 acres now being cropped.
- (5) Seeped and saline cropland areas that are increasing in size should be seeded to hay or pasture. Continuous cropping will better utilize excess moisture.

B. WATER RESOURCES

1. Problems

a. Water is rapidly becoming a priceless resource, and there are many demands to maintain or improve its quality. Community growth, agriculture needs and industrial development are dependent on adequate supplies and good quality. The project area has several interdependent water problems relating to its use and management. These are:

- (1) Excessive runoff from snow melt and spring rain causes some flooding which damages cropland, irrigation structures, roads and dwellings that are built on the flood plain. High sediment loads carried by the flood waters cause damage to fish habitat and silting of water storage impoundments.
- (2) Streambank and gully erosion are most severe during periods of high runoff. This increases the silt load and results in the destruction of valuable land.
- (3) Excessive use of water on cropland during periods of abundant supply causes loss of fertility, lower yields and drainage problems that take land out of production and increase farming costs.
- (4) Early day belief that individual ditches were necessary to establish and maintain water rights resulted in a large number of separate diversions and hundreds of miles of ditches. Many of these parallel one another and even cross each other to serve adjacent lands.

- (5) To compensate for a high conveyance loss, up to 50 percent more water than is needed is usually diverted. This results in badly seeped land below the lateral and the need to waste unused water in poorly designed wasteways (usually gullies).
- (6) A wide seasonal variation in stream flow results in high maintenance costs of diversion structures and canals.
- (7) Low summer flow in some streams causes a late season water shortage.
- (8) Lack of water storage causes low summer flows in many streams and late season water shortage for some cropland.
- (9) Water pollution in the project area results from soil erosion on poorly managed lands, stream channel disturbance, concentrated livestock feeding along streambanks, and inadequate sewage treatment of human waste.

2. Opportunities

- aa. Water quality in the project area is generally good with with an abundant supply during the early season.
 - (1) Water storage during spring runoff would reduce flood damage and streambank erosion. Irrigation needs could be met and recreational benefits increased. Some storage sites could even provide electrical power for industrial needs.
 - (2) Detention dams on small drainages would provide stock water and reduce the sediment load in the streams. Rock riprap is needed to protect the critical areas of stream channel that threaten destruction of valuable land.
 - (3) Improved systems of irrigation and educational programs will help land owners properly manage the water resource.
 - (4) Strong information programs should stress water right laws and how they affect the use and management of water. This would help reduce the number of diversion dams by about 35 and consolidate delivery canals to nearly 80 miles.

- (5) New permanent diversion would provide for good water control and eliminate the gravel dikes that are annually constructed and lost during high water.
- (6) Canal lining would reduce seepage loss and improve production on the wet lands below the laterals.
- (7) Cost benefit studies should be made of present irrigation systems to better evaluate the feasibility of new systems.
- (8) Low interest loans and accelerated cost share benefits would speed up construction of high cost water management practices needed to improve irrigation efficiency in the project area.
- (9) Water pollution can be improved with good land management practices that will reduce runoff and stabilize highly erodable soils, avoid stream channel disturbance and eliminate livestock feeding on flood plains.

C. RANGE and PASTURE RESOURCE

1. Problems

- a. Range and pasture conditions have deteriorated since the 1870's. More than half the range land and 85 percent of the tame pasture land in the project area needs improvement. Lack of deferment, heavy use, and poor water management practices have contributed to:
 - (1) An increase of undesirable weeds, brush and other woody plants that are less palatable.
 - (2) Increased soil erosion and runoff on fragile lands resulting in more sediment pollution.
 - (3) Reduced yields on irrigated pasture land through an imbalance of forage species.
 - (4) A decrease in livestock numbers that can safely graze the forage resource.
- b. Grazing pressure on range land is heaviest near watering facilities. Inadequate fencing and lack of stock water facilities have resulted in:
 - (1) Poor distribution of livestock and overuse of range in some areas.

- (2) Poorly developed springs and ponds intensify pollution problems and increase hazards of disease.
- c. Intermingled land ownership (private, state, and federal) compounds management problems of range use by:
 - (1) Public demands for multiple use benefits of federally managed lands.
 - (2) Short-term leases to private landowners.
 - (3) Increase costs for fencing grazing units.
 - (4) Management decisions on the manipulation of livestock are more difficult to reach.
- d. Sound range management practices have not been widely accepted by all ranchers in the area. This has resulted in:
 - (1) Deterioration of the range resource on some ranch units.
 - (2) Decreased income from livestock sales.
 - (3) Lower calf weights.
 - (4) A higher mortality rate.
 - (5) Increased runoff and erosion damage.

2. Opportunities

- aa. Good range management plans will provide guide lines to protect and improve the forage resource on range and pasture lands.
 - (1) Good livestock management coupled with mechanical and chemical control will reduce the weed and brush problem and increase available forage for livestock.
 - (2) Seeding and temporary fencing of critical erosive areas will increase plant cover and reduce runoff.
 - (3) Improved systems of irrigation on tame pasture land will reduce runoff and increase benefits from the use of fertilizers. Pasture yield can be more than doubled with good management.
 - (4) Once the condition of the range has improved through deferment and proper use, livestock number can be increased with good management.

bb. Fencing and water development will:

- (1) Provide more effective use of the range through better distribution of livestock.
- (2) Reduce the abuse on critical erosive lands.
- (3) Well-developed springs and the use of pipelines and tanks will provide clean unpolluted water for livestock and reduce disease and death loss.

cc. Long range interagency planning with private land owners will result in more effective use of the forage resource with multiple use benefit.

- (1) Long-term leases should be encouraged to make necessary development more economical. Needed fencing and stock water should be considered in the lease.

dd. More effective educational programs and training will point up the values and benefits in carrying out good management plans.

- (1) Cost return and budget analysis studies with operators who are in need of range improvement should be expanded.
- (2) Consideration should be given to computerized studies in budget analysis.
- (3) Soil erosion from runoff will be virtually eliminated if range land is properly managed.

D. WOODLAND RESOURCE

1. Problems

a. Much of the commercial timber in private and state ownership is located on steep dissected slopes of the drainageways and along stream bottoms. The dominant species are Pond-erosa pine and cottonwood, both being of rather poor quality. At present these areas are contributing little or no income to the private owner. Better markets and utilization for the use of this timber resources are dependent on several kinds of problems.

- (1) The two sawmills and one post yard are not getting sufficient raw material for successful operations.

- (2) Distances of hauling logs and post material to mill sites are too great for much economic return to the owner.
 - (3) Private holdings of timber lands are too small for profitable logging enterprises.
 - (4) Steep slopes, shallow soils, and rock outcrop make road accessibility and timber harvest more costly and hazardous.
 - (5) Fire, disease, and insect damage are a constant threat to private and state-owned timber lands.
- b. The availability and use of timber for wood products coming from federally managed land hinges on several factors.
- (1) At the present time the National Forest is conducting a reclassification study in the Beartooth Mountains to evaluate the timber, water, and land resources of the National Forest. All new access roads, timber sales, recreation developments, and other expanded uses will be curtailed until the study is completed, and recommendations are approved by the Secretary of Agriculture.
 - (2) Most of the timber resource on Bureau of Land Management lands have a low economic value for wood products. Juniper and Mountain Mahogany are the two major species.
 - (3) There can be no timber harvest within National Parks.
 - (4) The multiple use demands on federal lands will curtail timber harvest.
 - (5) There is a lack of access roads to mature commercial forests that could be harvested pending the evaluation study.
- c. The commercial forest lands are producing below their potential because of several reasons.
- (1) Mature stands of timber are not being harvested.
 - (2) Timber growth and tree quality are poor in stagnated stands.
 - (3) Most of the timber on private and state lands is being grazed and there is very little natural reproduction.

- (4) There has been very little reforestation of understocked areas.

2. Opportunities

aa. The opportunities for improving the timber resource on private and state-owned lands lie in management and marketing.

- (1) Landowners should be encouraged to develop timber management plans that would enable them to harvest mature trees under selective cutting.
- (2) Distances to mill sites could be reduced by the use of portable mills capable of handling small sawing jobs.
- (3) Where operating units are small encourage community or group development plans to make small jobs more economical in a small geographic area.
- (4) Develop more economical methods of harvesting timber on steep critical areas with a minimum of soil disturbance. Avoid clear cutting where there is a high erosion hazard.
- (5) Develop and implement an effective fire protection program between the counties and the State Forestry Department. Establish rural fire districts where needed and provide the necessary equipment and communications for deployment.
- (6) Be alert in detecting disease and insect damage. Early detection and treatment can avert a disaster. Clear cutting infested areas may be needed.

bb. The timber resource on federal lands is important to the economy of the project area.

- (1) Once the reclassification study of the National Forest land is complete, the sponsors are hopeful timber sales will be increased along with access roads. This would open new recreational areas and provide scenic beauty for everyone to enjoy.
- (2) Establish new industries and markets to utilize some of the colorful, twisting odd shape Juniper and Mountain Mahogany. Avoid wasteful cutting and harvesting in critical sites where erosion hazards are high.

- (3) Help protect and identify tree species in National Parks. This is your outdoor classroom; make an effort to become acquainted with nature's handbook.
 - (4) Well planned and properly managed federal lands will provide multiple use of lands without conflict.
- cc. Timber production can be increased on the commercial forest lands in the project by the following:
- (1) There is need for a better inventory of the timber resource on private lands. Species, age class, size, stand density, and site quality are needed for a better evaluation.
 - (2) Mature trees even though they are of poor quality should be harvested. In most areas selective cutting is more desirable.
 - (3) Thinning and pruning of stagnant stands which are not too old will improve the quality and rate of growth.
 - (4) Eliminate grazing on areas where you want natural reproduction of pine or Douglas-fir and on all reforested areas.
 - (5) Soil surveys will identify areas most suitable for tree growth. Detailed management plans should be keyed to soils.

E. MINERAL RESOURCE

1. Problems

- a. Mining is one of the more important income-producing industries in the state and Carbon County ranks second in its mineral value and returns. There is a great deal of mineralization in the project which have potential for further development if problems relating to the mineral resource can be overcome. While employment in mining fell drastically in Carbon County, Stillwater County showed an increase in activity during the same period (1950-1960).
- (1) Coal mining in the Red Lodge and Bridger fields has virtually been halted since the 1943 mine disaster near Bearcreek. High labor and development costs of underground mining makes it impractical to compete with the strippable coal fields on the major markets.

- (2) Large areas of bentonitic formation are known to occur in the project area, but the thickness of the beds are variable and in some cases discontinuous. Most of the samples tested fall short of the American Petroleum Institute (MPI) specifications for bentonite drilling mud. More exploration and research is needed for the use and development of the deposits in the project area.
 - (3) Sandstone was once quarried for building stone in an area south of Columbus. Lack of markets and high labor costs caused the quarry to shut down.
 - (4) Sources of clay that are suitable for the manufacturing of brick and high quality ceramic products were once mined in the Fromberg area and are no longer utilized.
 - (5) High quality gypsum deposits are known to occur in the Chugwater formations near Bridger, and these are virtually undeveloped.
 - (6) During World War II, chromite was mined and concentrated by American Chrome Company in Stillwater County. The ore deposits were classed as low grade and could not compete with other markets.
 - (7) Explorations show rather large deposits of copper and nickle bearing ores occur near the surface and could be mined with open pit operations. The disposal of overburden and milling waste could cause serious environmental problems.
 - (8) Uranium deposits are know to occur in the Pryor Mountain region, and locally fluorite is associated with the uranium minerals. The Carnotite uranium salts found in the area have not proven to be of commercial value without government subsidy.
 - (9) Untapped oil and gas reserves are believed to occur in the project area.
 - (10) With high shipping cost there is a need for industrial processing plants to effectively utilize the mineral resources.
- b. In mining activity there is always soil disturbance that results in accelerated erosion and causes sediment damage. Air and water pollution often result in careless development.

- (1) Surface exploration of mining claims destroys the protective plant cover causing soil loss and sediment damage to streams and farmland.
- (2) Severe gully erosion occurs where roads and trails are carelessly constructed on steep slopes.
- (3) Rich archeological treasures are often unknowingly destroyed in mining exploration.
- (4) Waste material is often carelessly dealt with.

2. Opportunities

aa. The development of the mineral resource in the project will result in new or expanded industry and provide more gainful employment in the area.

- (1) The industrial use of coal near the Red Lodge-Bridger fields could make it economically feasible to reopen the mines. New uses and modern processing methods are needed.
- (2) More exploration is needed on the quality of bentonite in the area along with processing plants and market development. Bentonite is used extensively for drilling mud in the petroleum industry; agriculture uses it for earthen lining of canals, ditches, and reservoirs; and industry uses it in foundries and in pelletizing iron ore concentrate.
- (3) The use of natural stone in building construction is becoming more vogue, and the possibility of reopening the quarries or developing new ores is dependent on markets and transportation costs.
- (4) Suitable clay deposits for the manufacturing of brick and ceramic products can be found in the Fort Union formations in western Carbon County. Processing plants should be encouraged to locate near the source to reduce shipping costs.
- (5) Exploration with core drilling equipment is needed to determine the extent of the gypsum in a given area. Its many uses will provide opportunity for development. Manufacturing plants could locate near Bridger to reduce shipping costs.
- (6) The processing of low-grade chromite ore to a concentrate at the mine would reduce shipping costs and provide a more favorable market to steel industries.

- (7) Open pit mining appears favorable for the recovery of copper and nickle deposits in the Stillwater drainage south of Nye. Carefully planned development for this type of operation is needed to minimize erosion and reduce pollution to an acceptable level.
 - (8) Uranium minerals are valuable as a source of radiant energy and the Office of Mineral Exploration advises there is a 50 percent support in the exploration of this mineral where valid claims have been established.
 - (9) Oil companies should be encouraged to continue their exploration for oil and gas reserves in the project area. Expansion of existing fields and the development of new fields would increase employment and possibly bring new industry to the area.
- bb. Mining activity and industrial wastes that cause pollution can be reduced by:
- (1) Reseeding disturbed areas where soil conditions are favorable to plant growth and top dressing other areas where a suitable soil is lacking.
 - (2) Smooth out steep overburden to reduce runoff and seed to adapted species.
 - (3) Avoid making trails or roads on steep landscape that will result in gully erosion.
 - (4) Use structural measures where needed to prevent water from concentrating and causing erosion.
 - (5) Provide sediment traps or basins to desilt runoff in exposed areas.
 - (6) Keep the State Archeologist informed of any known area that has historical value.
 - (7) Before exploratory mining begins check on the historical values of the area.
 - (8) Waste materials should be concentrated and disposed of in an acceptable manner to reduce both air and water pollution.

F. WILDLIFE RESOURCE

1. Problems

- a. There is need for better farmer-hunter relationship and improved management of lands for the benefit of wildlife by increasing food and cover.
 - (1) A few careless and irresponsible people have resulted in poor relations between farmers, ranchers and sportsmen.
 - (2) More lands are being closed to hunting and fishing which impairs the use and enjoyment of the wildlife resource. In some areas conflicts exist on the use of range for the benefit of wildlife and domestic livestock.
 - (3) Access to many public areas with good wildlife populations is not possible because intervening private lands are closed to hunting or fishing.
 - (4) Big game animals, particularly elk, are not as plentiful as sportsmen desire. Winter food is a limiting factor.
 - (5) There is not enough good nesting habitat for waterfowl.
 - (6) In many areas there is inadequate escape and roosting cover for upland game birds.
 - (7) Chemical spraying, burning, and clean tillage reduces food and cover benefits to wildlife.
 - (8) Many local, state and federal programs are not designed to aid landowners in maintaining food and cover for wildlife.
 - (9) Increased fishing pressure combined with deteriorating fishing waters poses a problem for maintaining and increasing the fisheries resource in the project area.
 - (10) Many fish become isolated and die in irrigation ditches each season where diversion ditch headgates are not controlled.
 - (11) Lack of streambank cover and improper channel construction contributes to poor fishing.
 - (12) In many streams irrigation water withdrawals during peak use periods reduce streamflow to levels harmful to fish and in many cases inhibit reproduction.

- (13) Chemical, biological, and sediment pollution seriously threatens the fishing resource.
- (14) Some of the more popular fishing streams and lakes are located near the Montana-Wyoming border. Licensing requirements of each state are separately enforced and sportsmen using these waters have difficulty complying with the laws.

2. Opportunities

- aa. Many landowners have an opportunity to realize income from fees for access to hunting and fishing, guide service, care of meat, and lodging for the sportsmen. The opportunity to provide food and cover for wildlife are unlimited.
 - (1) The Three C program, "Courtesy, Cooperation & Common Sense," of the Montana Fish and Game Department should be initiated and supported throughout the project.
 - (2) The Forest Service and Montana Fish and Game Department need support for their acquisition of easements and access to prime hunting and fishing areas.
 - (3) Landowners and County Commissioners can provide and regulate access provisions.
 - (4) Public acquisition of key winter range areas needs resource committee action and support. Public agencies need to make purchase agreements extending over several years.
 - (5) Developing water areas and cattail marshes to improve waterfowl habitat and nesting facilities. There is opportunity for such development in the Edgar-Fromberg area.
 - (6) The acceleration of pond construction and stream fencing will benefit waterfowl nesting and improve hunting.
 - (7) Accelerated program of tree and shrub plantings in and around cultivated areas to improve cover needed for upland birds. Protection of woody plants in odd areas of farms will improve existing wildlife cover. Avoid burning particularly during the nesting season.
 - (8) Educational programs for proper use of chemicals that are compatible with wildlife management should be developed and accelerated.

- (9) Federal cost sharing programs that provide incentive payment to farmers and ranchers for preserving and developing food and cover for wildlife are available and need to be encouraged.
- (10) Coordinated planning efforts of farmers, ranchers, and public agencies are needed to fully develop the multiple use benefits of land for wildlife.
- (11) High mountain lakes on the Beartooth plateau are presently supporting stunted brook trout. Many of these lakes can be restocked and fishing improved.
- (12) Potential small watershed projects under P.L. 566 would provide additional wildlife benefits.
- (13) Some highway construction fills that cross waterways can be designed to impound water suitable for fish plants.
- (14) The gradual closures of headgates over a period of several days will give fish a chance to return to the stream. Ditch companies should be encouraged to follow.
- (15) Channel construction and streambank cover can be designed to have a negligible effect on the fishing quality of the stream.
- (16) By reorganizing irrigation systems and combining ditches, there could be a larger volume of water left in the stream and have less damage to fish.
- (17) Stream pollution can be reduced with erosion control practices that reduce runoff and through more careful use of chemicals. Full cooperation is needed by everyone.
- (18) There would be less violation and need of enforcement if Montana and Wyoming would provide reciprocal licensing for the common use of fishing waters in this area.

G. RECREATION RESOURCE

1. Problems

- a. Accessibility to present recreation areas is limited and there is a need and potential to develop additional facilities for people to enjoy and utilize this choice resource that is virtually untapped.
 - (1) There are many historic sites in the Beartooth area which are often abandoned, deteriorating and vandalized.
 - (2) Good tourist routes are a major factor in the development of the recreation potential of the Beartooth area. Lack of east-west routes and access roads limits visitor use.
 - (3) Priceless archeological sites in the Pryor Mountains are being destroyed by vandals.
 - (4) The Yellowstone State Recreational Waterway is developing into a popular boat and raft recreation facility. There is a lack of stopover areas at intervals along the waterway.
 - (5) There is lack of coordination between individuals, private and public organizations where both are developing recreation plans and programs.
 - (6) The recreation potential of the project area is not adequately publicized and little is known of its values, regionally or nationally.
 - (7) There is a lack of parks, swimming facilities, golfing, bowling, sightseeing, drive-in stores and laundries needed for total development of visitor facilities.
 - (8) Overnight accommodations in Yellowstone National Park are not adequate to accommodate an expanding number of visitors.
 - (9) Visitor facilities are needed to accommodate large crowds of skiers at Red Lodge Mountain.
 - (10) A tremendous demand for snowmobiles has caused a corresponding upswing in snowmobile manufacture and a consequent need for space in which to use them.

- (11) Ice caves of the Pryor Mountains are one of the more interesting natural phenomena. The problem of maintaining controlled temperatures limits their use.
- (12) More youth camps are needed in the area as Billings and other population centers grow.
- (13) Boating recreation is limited primarily to Bighorn Lake and Cooney Reservoir. The recreation facilities for these areas are in the early stages of development with completion several years in the future.
- (14) Senior citizens find the Beartooth area a desirable place to live. Suitable recreation facilities for this group are lacking. Dude ranches, vacation farms and similar rural recreation facilities are not commonly available.

2. Opportunities

- aa. Opportunity exists for landowners to provide recreation and realize income by developing scenic attractions and accommodations for the public. Planned developments will provide orderly use of the area and reduce the incidence of vandalism.
 - (1) Many noteworthy historic sites are accessible to the visitor. Community projects to clean them up and provide colorful factual information would enhance the area. Support can be extended for additional funding to develop and install protective measures to secure their value. Local organizations can cooperate and assume long time responsibilities for these projects.
 - (2) A network of gravelled county roads now serves the Beartooth area. Project assistance could aid in initiating a comprehensive study and recommend selected routes to be graded and oiled.
 - (3) Museums, viewing trails and roads and other associated facilities are now being coordinated and planned by agencies in the area. Properly designed areas with appropriate safeguards will make these attractions available to the public.
 - (4) Stopover areas can be developed on river islands along the Yellowstone, some of which are public domain. Other suitable areas are on privately owned lands that can be developed for this use.

- (5) Project support will aid in achieving a proper balance in development and coordination between private and public interests for recreation use.
- (6) A good advertising program should be initiated by project committees to secure recognition of the recreation values of the Beartooth area. Local points of interest should be listed in national travel brochures so visitors can plan stops. Tours, advertisements, travel contacts, and other methods have proven successful elsewhere and should be successful here.
- (7) Develop and publicize attractive city parks, bowling alleys, golf courses, swimming pools, well-kept drive-in stores, laundry facilities and other daily needed services.
- (8) Development of comfortable attractive overnight accommodations should be encouraged in all towns in the Beartooth area. Publicity programs on accommodations should be directed toward national park tourists to acquaint them with attractive facilities outside the park boundaries.
- (9) Project assistance should be given to study feasible methods of enlarging parking areas and additional tow facilities at Red Lodge Mountain Ski Resort.
- (10) There are some snowmobile routes on public lands and there is great opportunity for development of such routes on private lands along the scenic mountain front. Groups of ranchers could develop routes, rest stops, and eating facilities on their land to enrich the enjoyment of this winter sport. Renting hay fields for private or club use would provide supplemental income to the owners.
- (11) The cool refreshing enjoyment of the natural ice caves would be welcomed by many tourists if it were possible to maintain temperature control. This factor determines the extent this major tourist attraction may be used. Many limestone caverns, including Mystery and Royce caves, have potential for public viewing.
- (12) Committee action to determine future needs for youth camps should be made. Studies would indicate the need to develop additional camps on public and private lands. Good facilities along with advertising would bring many youths from metropolitan areas.

- (13) Project assistance should be extended to the Bighorn National Recreation Area and the Montana Fish and Game Department to secure adequate funding to develop these recreational projects.
- (14) Places where retired people can gather and enjoy group activities can be provided in most communities. Rural people have many recreation income opportunities. A great potential exists for rural recreation facilities in the area. Feasibility studies should be made to show the potential of these enterprises.

H. HUMAN and ECONOMIC RESOURCES

1. Problems

- a. A number of social and economic problems relate to the population of the area. Many are deep seated and historical. Others are extensions of social changes affecting the state and nation. Common problems of the area are:
 - (1) Out-migration of young people has caused a decline of population of 25 percent in the last 25 years.
 - (2) Lack of employment opportunities for youth and lack of yearlong employment for others.
 - (3) Lack of training programs and facilities.
 - (4) Limited housing facilities for employees does not attract industry or small businesses.
 - (5) Limited management abilities in many small businesses reduce efficiencies in operations.
 - (6) Inadequate credit often limits the merchant's ability to offer a wide selection of merchandise.
 - (7) Lack of facilities and services to satisfy needs of older people with little opportunity for them to pursue specialized skills or satisfy their social requirements.
- b. Lack of development of the cultural resources. Development and improvement of public and community facilities will enhance the general economics and social climate of the entire area. These conditions are typified by:
 - (1) Shortage of hospital and medical services.

- (2) Lack of community centers, libraries, parks, and other recreational and communicational facilities.
- (3) Small schools in area make it difficult under rising costs to provide educational opportunities of larger schools.
- (4) Inadequate water and sewage facilities.
- (5) Lack of solid waste disposal facilities.
- (6) Shortage of public funds.

2. Opportunities

aa. The opportunities for correcting and improving these deficiencies are great. These include organizing, developing and encouraging multi-county development organizations and city-county planning boards to guide orderly development. The development of long range plans will provide opportunities for solution of the problems such as:

- (1) Dedication of locations as sites or parks to provide for industrial expansion compatible with broad resource development.
- (2) Organizing training programs and develop facilities for essential skills to create a labor force necessary for economic expansion and provide employment for young people.
- (3) Developing inventories and information files by local organizations for use by prospective employers.
- (4) Coordinate local and outside agencies to provide technical and financial assistance to arrange credit for long-term loans at low interest.
- (5) Emphasizing winter recreation and small business development to help alleviate the winter employment slump.
- (6) Concentrate efforts of project committees to bring expertise of agency people to bear in solving the problem.
- (7) Coordinate programs to carry on studies of educational needs in the area for improving school facilities and instructions.

- (8) Establish or improve community water and sewage facilities and public sanitary land fills through joint effort of local, state and federal financing.
- (9) Investigate programs for low cost housing development.
- (10) Provide project assistance to encourage business management counseling from organization and agencies whereby local banks may provide credit when there is evidence of good management.
- (11) Investigate opportunities to obtain grants and long-term credit to develop historic, cultural and other natural wonders in the area.
- (12) Organize local leadership to recognize the potential for cultural development such as antique shops, museums, art centers, theater groups and national festivals.
- (13) Provide accessible, attractive gathering places where older people can gather for social and recreational activities.
- (14) Creating an atmosphere to influence retirement-age medical personnel to choose the area for their home.

PROJECT MEASURES



Intensive farming requires uniform, level fields.



A weed choked, meandering ditch is rebuilt and lined with concrete.



Well engineered diversion dams provide good control of water for irrigation.

Volunteer firemen are upgrading their units in cooperation with the State forester.



SECTION IV

PROJECT MEASURES to be INSTALLED

DEFINITION of TERMS

Project Measures: Actions needed and proposed by local interest groups for the orderly conservation, development, improvement, and utilization of natural resources of the project area. Includes structural measures, land treatment, associated measures, and supporting measures.

Accelerated Services: The technical assistance increase above going program rate for soil surveys, conservation planning and application, and for other services necessary to meet project objectives.

Structural Measures: Structural measures ordinarily require community or group action for planning, construction, operation and maintenance, and always require group benefits for justification.

Critical Areas: Critical areas are gullies or seriously eroding lands which are sources of excessive runoff or sediment contributing to downstream damages or which, if untreated, would adversely affect planned structural works of improvement.

Land Treatment: Needed land use adjustments and combinations of practices compatible with the needs and capabilities of the land and the objectives of the people involved.

Associated Measures: Facilities or enterprises necessary for the processing, marketing, and utilization of the products from natural resources.

Supporting Measures: Developments or enterprises compatible with project objectives and involving assistance that is primarily a responsibility of organizations outside the U. S. Department of Agriculture.

The proposed installation of project measures is based on present available knowledge. We propose to reconsider the installation of project measures frequently and to currently adjust to meet changes in program and fund availability.

A. ACCELERATION of GOING PROGRAMS on PRIVATE and STATE LANDS

1. Soil Surveys

Developments involving the total environment are underway or proposed in the Beartooth area. Involved is the use of irrigated and dry cropland, rangeland, woodland and other factors affecting wildlife and recreation.

Sound resource planning and development requires the basic data provided in soil surveys. All the land in Carbon County, except 252,000 acres of Custer National Forest land in the Beartooth Mountains has been soil surveyed. Remaining to be done is 957,000 acres of private and state land in Stillwater County.

The need for soil surveys is dependent on location and size of unsurveyed areas, land use and the kinds, amounts and timing of proposed measures. With acceleration the soil survey can be completed in five years to provide a soil inventory needed for sound land use decisions.

ESTIMATED FINANCIAL NEEDS for ACCELERATION of SOIL SURVEYS

<u>Fiscal Year</u>	<u>Acres</u>	<u>RC&D Acceleration</u>
1971	100,000	\$10,000
1972	150,000	\$15,000
1973	150,000	\$15,000
1974	150,000	\$15,000
1975	150,000	\$15,000

One soil scientist will map approximately 150,000 acres per year. This accelerated rate would allow completion of the survey in Stillwater County in 5 years.

2. Accelerated Conservation Planning

Analysis of the project area shows about 127,000 acres of irrigated land, 317,000 acres of dry cropland, 1,167,000 acres of range and pasture land, and 111,000 acres of state and private forest land. Only one-fifth of the operating units representing about one-fifth of the private and state lands have developed conservation plans. Some of the plans in effect are considered to be in need of revision to keep current with new developments.

Current planning assistance was projected for 20 years to determine need for accelerated assistance. Accordingly, one and one-half man-years will be required annually to get desired acceleration for planning in fiscal years 1971 and 1972.

The need for assistance is expected to increase as the works of improvement are installed and in operation. The project area includes 1,229 farm operators on about 1,830,000 acres of private and state-owned land.

ESTIMATED FINANCIAL NEEDS for ACCELERATION of CONSERVATION
PLANNING

<u>Fiscal Year</u>	<u>RC&D - Dollars</u>
1971	\$22,500
1972	\$22,500

3. Land Treatment

Essential to the success of the accelerated land treatment measures including necessary measures to prevent degrading of the environment is continued cooperation with other units of government. Federal, state, county, and local organizations have need for technical or financial assistance. The needs for additional land treatment measures by major land use during the next twenty years are:

a. Private non-forest land

- (1) Cropland practices are needed on approximately 110,000 acres of irrigated land at a cost of \$15,000,000.
- (2) Non-irrigated cropland practices are needed on approximately 174,000 acres at a cost of \$1,750,000. Of this acreage approximately 26,000 should be planted to grass.
- (3) Range and pasture land practices are needed on approximately 748,000 acres at a cost of \$2,250,000. Approximately 17,000 acres of pasture lands are irrigated and are in need of improved systems.
- (4) Weed control - County-wide weed districts have been formed to help control weeds in the project area. The noxious weed problem is becoming more serious each year and present methods are not adequate to meet the problem. The extent of noxious weeds in the project is estimated at 8,500 acres with Canada thistle and Leafy spurge leading the list. Other troublesome weeds are Whitetop, Perennial sowthistle, Common and Dalmation toadflax, and both Russian and Spotted knapweed. The estimated cost of control is \$250,000 annually.

An accelerated education and land treatment program is needed for more effective control of weeds. The use of clean seed and better means of checking the expansion of infested areas are needed. Financial assistance to weed districts and individuals is needed to accelerate the program.

- (5) There are 50,000 acres needing wildlife and recreational practices at a cost of \$2,500,000.
- (6) Rural fire districts are needed to insure protection and suppression of wildfires on all private and state-owned lands in rural areas. A cooperative fire protection program has been initiated by agreement between the two-county project area and the Office of the State Forester. This program will help control forest, range and other wildland fires that occur on lands adjacent or contiguous to agricultural farmland. Suburban areas and structures in the rural areas will receive assistance also. The initial cost estimate to acquire the necessary equipment and establish the needed fire districts is \$102,225. It is anticipated this type of protection will cost land owners of classified forest land 2 or 3 cents per acre annually. Assistance in funding will be necessary to implement this program.

b. State and private forest land

- (1) Forest land practices are needed on about 44,000 acres or 64 percent of the commercial forest lands at a total cost of \$1,306,000. The practices include improvement measures such as pruning, thinning, and harvesting that will improve the quality and quantity of wood products.
- (2) There are about 42,500 acres of non-commercial forest lands where timber management practices are not economically feasible except for fire and insect control.
- (3) Grazed woodland commercial and non-commercial amount to nearly 100,000 acres for state and private woodlands. Forage production improvement is needed on about 50,000 acres or 50 percent of the land at a cost of \$150,000. These improvements include brush control, reseeding, deferment proper grazing and stock water development.
- (4) A better inventory of the woodland resource is needed to determine the extent and value of woodland. Accelerated planning and application of technical assistance

will help landowners make needed land use adjustments and apply treatment measures that will achieve the goals in the project objectives. Estimated funds needed for the installation of land treatment and on farm structural measures for private and state-owned lands over the next 20 years are as follows:

1. Irrigated cropland - 110,000 acres (Improved systems and management)	\$15,000,000
2. Non-irrigated cropland - 174,000 acres (Conservation cropping systems)	\$ 1,750,000
3. Range and pasture land - 748,000 acres (Improvement)	\$ 2,250,000
Grazed woodland - 50,000 acres (Protection & improvement)	\$ 150,000
4. Woodland - 44,000 acres (Stand improvement & protection)	\$ 1,306,000
5. Noxious and problem weed control - (8,500 acres annually)	\$ 5,000,000
6. Fish plants & recreation developments	\$ 2,000,000
7. Anticipated watershed or large group developments (10 feasible projects)	<u>\$10,000,000</u>
Total Costs	\$37,456,000

c. Federal lands

(1) National Forest

There are 501,205 acres of national forest lands in the Beartooth RC&D Project. Most of this land occurs in the Custer National Forest in the Pryor and Beartooth Mountains. The Forest Service is in the process of conducting a reclassification study in the Beartooth Mountains to evaluate the classified Primitive Area and adjacent lands. This study will provide information to formulate long-range plans for the future use and development of National Forest land in the project area. This study is required by law under the Wilderness Act of 1964 and is to be completed by 1973. Recommendation will be made to the Secretary of Agriculture for his consideration. All new developments such as access roads, timber sales, recreation and other expanded uses will be curtailed until the

study is completed and recommendations approved by the Secretary. Much of the national forest has a high potential for recreation and aesthetic value. The installation of presently planned programs will continue in areas of heavy recreational use. The basic objective of the forest land improvement program is to develop the natural resource of range, forest, water and recreational use on national forest lands. The estimated costs for these improvements over the next 20 years are as follows:

Structural measures:

Construction and reconstruction of roads and trails (154 miles)	\$ 4,685,700
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Land treatment:

Range Management (Fencing & water development)	\$ 33,900
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Timber Management (Planting & thinning 1490 acres)	<u>\$105,500</u>	\$ 139,400
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Recreation Campgrounds and Improvement:	\$ 3,675,000
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Lake Shore Improvements (Wild Bill & Greenough Lake)	
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Other	\$ 5,500
Total	<u>\$ 8,505,600</u>

These costs may change pending the results of the reclassification study.

(2) Public Domain

Public domain lands are under the management of Bureau of Land Management and constitutes approximately 243,818 acres in the project area. The Bureau of Land Management is committed by law and regulation to a program of multiple use of the public domain in the project area. Multiple use requires a careful combination of uses and activities on the same land area to best serve the public needs. This can be achieved only by advanced planning, orderly program development and proper management of the following resources: Forage, Timber, Wildlife, Watershed, Recreation, Minerals, and Lands. Since basic planning has not been completed on public domain lands in the project area, it is not possible to list projects and costs at this time. More information will be available for

the area south of the Pryor Mountains by 1971 when the Management Framework Plan will be completed. Increased planning activities will be necessary before project measures can be identified in the remainder of the public domain lands in the project area. Proper protection of the environment necessitates careful consideration of all needs on public lands before physical treatment is initiated.

Structural Measures:	\$
Land Treatment:	\$
Recreational:	\$
Other:	\$
Total	\$15,000,000

- (3) Bighorn Canyon National Recreation Area has approximately 30,000 acres of land along the eastern edge of the Beartooth RC&D Project. This land is being developed as part of a national recreation area that will provide a setting to invite a wide variety of recreation benefits. There are many scenic wonders in the geologic formation that are rich archeological treasures. Facilities will include camping, picnicking, hiking, riding, boating, fishing, hunting, and opportunity to view many kinds of natural wildlife. Road and trail construction will provide an easy access for people to enjoy this spectacular scenery. The estimated cost for these developments in the Carbon County portion of this national park during the next 20 years are:

Structural Measures:	\$
Land Treatment:	\$
Recreational:	\$
Other:	\$
Total	\$ 5,000,000

4. Agricultural Conservation Program (ACP) Cost Sharing

The accelerated need for ACP Cost Sharing will be in excess of present availability of funds. For example, in 1969 the available funds for federal cost sharing in the project area were \$183,000. With acceleration of project activity through the RC&D action program, requests for cost sharing will be substantially increased. Occasionally, additional funds are needed for flood control.

5. Credit Needs

Many, if not most of the landowners, will require some source of credit to meet their share of the cost of installing land

treatment measures and structural improvements.

It is recognized that approximately one-third of the funds needed for carrying out these proposed projects will be provided by private lending institutions.

Local sources will seek financial assistance from the Farmers Home Administration through either the Soil and Water Conservation loan or RC&D loan facilities to meet project objectives. Credit needs from these sources for the next two years are estimated to be:

<u>Year</u>	<u>RC&D</u>
1971	\$ 21,000
1972	\$125,000

B. STRUCTURAL MEASURES

- a. Structural measures are those which ordinarily require community or group action for planning, construction, operation, and maintenance. They always require group benefits at a ratio greater than one to one. Structural measures on the following projects are proposed for construction in fiscal years 1970, 1971 and 1972.

1. Mutual Ditch Company

This project measure will consist of irrigation canal alignment to prevent bank erosion and serious seepage loss. There are 34 water users served by this ditch company. It is anticipated the work will be completed prior to July 1, 1970. Estimated costs are:

	<u>RC&D-\$</u>	<u>ACP-\$</u>	<u>OTHER-\$</u>	<u>TOTAL-\$</u>
Construction		\$1200	\$1200	\$2400
Installation Services	\$200			\$ 200
Easements & contracts				
Administration			\$ 240	\$ 240
Totals	\$200	\$1200	\$1440	\$2840

2. Doctor Ditch Company

This project measure is to stabilize an eroding canal by installing drop structures at appropriate location. There are six water users on this canal. The project will be constructed in fiscal year 1971. Estimated costs are:

	<u>RC&D-\$</u>	<u>ACP-\$</u>	<u>OTHER-\$</u>	<u>TOTAL-\$</u>
Construction		\$3000	\$3000	\$6000
Installation Services	\$1050			\$1050
Easements & Contracts				
Administration			\$ 200	\$ 200
Totals	\$1050	\$3000	\$3200	\$7250

3. Weast Canal Company

Approximately 12,000 feet of the canal requires enlargement and re-alignment. A portion will require lining to prevent excessive seepage loss. Forty-seven water users will benefit from the improvement. Construction to be completed in fiscal year 1971. Estimated costs are:

	<u>RC&D-\$</u>	<u>ACP-\$</u>	<u>OTHER-\$</u>	<u>TOTAL-\$</u>
Construction		\$2600	\$2600	\$5200
Installation Services	\$ 470			\$ 470
Easements and Contracts				
Administration			\$ 750	\$ 750
Totals	\$ 470	\$2600	\$3350	\$6420

4. Pleasant Valley Canal-Irrigation Pipeline

The purpose of this project is to install 800 feet of 54 inch steel pipe with concrete inlet and outlet structures to bypass a section of the Pleasant Valley Canal. Purpose of the pipeline is to convey water around a hillside section where seepage from the canal has caused slippage and failure of the canal. Sixteen water users are served by this canal. This project will be installed in fiscal year 1971. Estimated costs are:

	<u>RC&D-\$</u>	<u>ACP-\$</u>	<u>OTHER-\$</u>	<u>TOTAL-\$</u>
Construction		\$15,000	*\$15,000	\$30,000
Installation Services	\$1,050			\$ 1,050
Easements & Contracts				
Administration			\$ 1,500	\$ 1,500
Totals	\$1,050	\$15,000	\$16,500	\$32,550

* Application has been made for a \$10,000 FHA loan.

5. Lincoln Ditch Company

The purpose of this project is to install concrete inlet and outlet structures in the Lincoln Ditch and lay 1,400 feet of 30 inch diameter concrete pipe as a siphon. This will stop erosion, conserve water, and eliminate a noxious weed problem. Six water users are served by this canal. This project will be installed in fiscal year 1971. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$11,000	\$11,000	\$22,000
Installation Services	\$1,350			\$ 1,350
Easements & Contract				
Administration			\$ 1,100	\$ 1,100
Totals	\$1,350	\$11,000	\$12,100	\$24,450

6. Kapor Drain

The purpose of this drain is to intercept ground water flows originating as seepage from excess irrigation on higher lands and concentration of waters in highway borrow ditches. Two landowners will be benefited. This project will be constructed in 1971. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$2,100	\$2,100	\$ 4,200
Installation Services	\$ 360			\$ 360
Easements & Contract				
Administration			\$ 420	\$ 420
Totals	\$ 360	\$2,100	\$2,520	\$ 4,980

7. Rock Creek Ditch Company

The purpose of this project is for re-alignment and lining of a section of canal to eliminate a serious seepage problem. The seepage causes damage to lower lying areas and reduces the production on valuable cropland. Twenty-six water users are served by this ditch company. This project will be constructed in fiscal year 1971. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$8,400	\$3,600	\$12,000
Installation Services	\$1,560			\$ 1,560
Easements & Contract				
Administration			\$1,000	\$ 1,000
Totals	\$1,560	\$8,400	\$4,600	\$14,560

8. Weir-Crawford Irrigation Ditch

This project consists of installation of a concrete pipe siphon, new dike, ditch and a diversion structure to eliminate serious seepage problems and enable diverted water to be delivered to the irrigated lands. Two land-owners will be benefited. This project will be constructed in fiscal year 1971. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$1,250	\$1,250	\$2,500
Installation Services	\$ 780			\$ 780
Easements & Contract				
Administration			\$ 125	\$ 125
Totals	\$ 780	\$1,250	\$1,375	\$3,405

9. Columbus Water Users Association (State Water Board Canal)

This project consists of a replacement of 1,680 feet of metal flume or the construction of a pipe siphon to replace the flume in the State Water Board Canal which services 20 people. This would reduce conveyance loss and increase water delivery at a reduced operating and maintenance cost. This project will be constructed in fiscal 1971. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$36,000	\$36,000	\$72,000
Installation Services		\$ 4,000	\$ 4,000	\$ 8,000
Easements & Contract				
Administration	\$2,000		\$ 3,000	\$ 5,000
Totals	\$2,000	\$40,000	\$43,000	\$85,000

10. Free Silver-Smith Diversion and Ditch Consolidation

This project measure will combine the Free Silver and Smith Ditches using only one diversion. The new headgate structure and canal will be designed to carry 75 cubic feet per second (cfs) and irrigate approximately 2,000 acres. The consolidation will reduce the present conveyance loss by more than 50 percent and improve the delivery systems to all water users under the project. This project is planned for construction in fiscal year 1972 and will benefit 17 landowners. Estimated costs are:

	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
Construction		\$35,000	\$35,000	\$70,000
Installation Services	\$7,000			\$ 7,000
Easements & Contract Administration			\$ 3,000	\$ 3,000
Totals	\$7,000	\$35,000	\$38,000	\$80,000

b. Potential Watersheds or Large Group Projects

The Missouri River Basin Investigation revealed ten potential PL-566 watersheds or large group projects within the Beartooth Project Area. A Type IV River Basin Survey for Wind-Bighorn-Clarks Fork River Basin has been authorized and will be initiated this year. It is anticipated this survey will provide detailed information on the economic and physical feasibility of the potential projects. It is further anticipated that several of the watersheds or large group type projects will be developed during the next 20 years at a cost of \$10,000,000

c. Recreation and Wildlife Structural Measures

There is increasing interest in developing the high potential recreation type projects. The fact that Yellowstone National Park is likely to establish early use regulation to prevent overcrowding, creates untapped opportunities for developing holding areas for tourists within the project, particularly in the southern portion. Should pending legislation to authorize cost sharing for fish and wildlife purposes in RC&D projects be passed, it is anticipated a number of structural project measures will be proposed and developed.

d. Ditch Consolidation & Sprinklers

There is a need for several other ditch consolidations and an opportunity to develop gravity pressure sprinkler systems for more efficient use of irrigation water in the project area. The increased demands and competition for water supplies clearly indicates the need and possibility of such development in the area, where projects are economically feasible. These costs are included in the overall development and improvement needs for 110,000 acres of irrigated land.

Estimated funds needed to initiate and develop the proposed structural measures for group jobs in the next three years are:

<u>Fiscal Year</u>	<u>RC&D \$</u>	<u>ACP \$</u>	<u>OTHER \$</u>	<u>TOTAL \$</u>
1970	\$ 200	\$ 1,200	\$ 1,440	\$ 2,840
1971	\$ 8,620	\$ 83,350	\$ 86,645	\$178,255
1972	\$ 17,000	\$115,000	\$125,000	\$257,000

C. ASSOCIATED MEASURES

Associated measures are facilities, activities or enterprises necessary for the processing, marketing, and utilization of the products from natural resources. Federal agencies have long range plans for the development of these resources on the lands they manage. Agencies will assist private enterprise in the accomplishment of all associated project measures that will help meet the objectives and obtain the goals within the project area. The Program Committee has received 10 proposals to date.

1. Recreation

The development of the recreation potential in the project area is highly desirable and this resource is essentially untouched. There is more and more emphasis being placed on outdoor recreation and the opportunities for developing these facilities in the area are numerous.

- a. The Forest Service plans an expenditure of nearly \$4,000,000 for the development of campground and recreation improvements over the next 20 years.
- b. The Bureau of Land Management is committed to develop long range multiple use plans. The Pryor Mountain wild horse lands plan is under development and involves all resources directly related to the area. This plan is closely coordinated with developments in the Bighorn Canyon Recreational Area of the National Park Service and lands managed by the National Forest in the Pryor Mountain region. At this time no cost figure is available for the development of the recreational phase of the plan.
- c. The Montana Fish and Game plan an expenditure of \$350,000 during the next 4 years for recreational improvements and further development of the Cooney Reservoir area. An additional \$5,000 is needed annually for operation and maintenance. Expansion of picnic areas, camping facilities, tree planting, fencing, boating docks, access roads and sanitation facilities are included in the plan. Fish plants and access sites are estimated to cost more than \$1,000,000 during the next 20 years.
- d. A project proposal for a commercial trout farm near Rockvale will provide excellent recreation for tourists passing through the area as well as producing commercial fish for local markets. It is estimated this project will cost \$25,000. Source of funding has not been determined.

- e. There is a project measure for an improved educational program to inform the people in the project of studies being made and to secure local participation in the reclassification of the Beartooth and Absaroka Primitive areas. These are key recreational areas which offer spectacular beauty and enjoyment.

2. Other Developments

There have been seven other associated measures proposed to the Program Committee that would involve an expenditure of about \$215,000. A source of funding has not been determined.

- a. Two proposals are for special studies to determine the economic feasibility of ditch consolidation in Carbon County and cost of reclaiming seeped or wet farmlands. It is estimated these studies will cost \$12,000 and should be completed within a 2-year period.
- b. Two proposals are to obtain new aerial photographs for Carbon and Stillwater Counties.
- c. There is a proposal for a feasibility study of a post and pole plant near Bearcreek. A shortage of raw material hinders the development of this project.
- d. A proposal for a cooperative fire protection program between the two counties and the State Forestry Department would provide adequate fire protection to the rural areas. An estimated cost to properly equip each of the needed fire districts would be \$102,000.
- e. A proposal for a meat packing and locker plant to service Park City and vicinity would provide needed goods and services to that area. The estimated cost is \$100,000.

D. SUPPORTING MEASURES

Supporting measures require primary assistance from agencies other than U. S. Department of Agriculture. However, some projects will require consultive assistance on problems dealing with soils, engineering and water management.

The Program Committee has received proposals for sixteen supporting measures. They consist of road construction and improvement, sanitation facilities such as sanitary landfills and sewage lagoons, group purchasing and resource centers for schools, salvage service for used and junked cars, enlargement of parking facilities at winter recreational sites, concrete post factory and accelerated archeological studies to preserve and protect the historical values. The total estimated cost of these measures is \$2,500,000.

The following are typical examples:

1. Hardsurfacing sixteen miles of secondary highway from Edgar to Pryor. This will connect with oiled highways that will provide all weather access to the Bighorn Canyon National Recreation Area and Custer Battlefield. There are many historic and scenic wonders that will provide added enjoyment. It will also serve as a farm to market road that will better serve the Crow Indians. The estimated cost is \$1,250,000 with some of the cost shared by state and federal funds.
2. There is a project measure for establishing a resource center that could serve the small high schools and elementary schools in the area. This center would have special educational equipment that could be circulated and give the young people a better chance to qualify for higher education and provide opportunities they would not receive otherwise. The estimated cost of this program is \$25,000 annually.
3. Two communities have requested assistance to improve their garbage disposal facilities by means of developing sanitary landfills. The estimated cost is \$15,000, not including maintenance. Other communities in the project need similar help.
4. There are two proposals to improve the health needs and services in the project area. The use of a public health nurse at a cost of \$9,000 annually. Provide a testing program to screen possible diabetics. Cost is undetermined.
5. There is a need for a well catalogued salvage service with proper advertising to dispose of used cars which become eyesores to the community once they are abandoned. It would require about \$15,000 to establish a copyright, pay wages, and obtain needed supplies to keep the business going for two years.
6. A marketing study is needed on the feasibility of manufacturing concrete posts. If markets are available it is estimated that \$15,000 would be needed to purchase equipment and supplies.
7. A limited number of archeological studies in the Pryor Mountains reveal there is rich evidence of early man. It is believed other portions of the project also were frequented by primitive people. Once discovered these sites should be carefully studied to record their full historical value. At this time the amount of financial assistance needed to study new discoveries is not known.

PROJECT ECONOMIC IMPACT

PROJECT INSTALLATION

**PROVISION for OPERATION
and MAINTENANCE**

Chateau Rouge
Condominium at Red
Lodge serves the
apartment owner,
ski enthusiast and
tourist.



Timberweld Mfg. Co. shows
that industry can be suc-
cessful. About 40 people
are employed.

Grass seed production in
the can be a profitable
enterprise.



SECTION V

PROJECT ECONOMIC IMPACT

The economic impact of activities occurring in a project such as the Beartooth RC&D are comprised of a number of separate, but interdependent and inter-related sources. Development or improvement of resource use provides direct on-site benefits such as an increase in net return to the landowner or operator. For example, a flood protection project benefits, reduces or eliminates land damage and permits flooded areas to be used at a higher level of management with less hazards.

Benefits also accrue as associated or secondary benefits. Secondary benefits include increased employment opportunities, both during project construction and for its operation and maintenance. Other associated benefits include increased employment and profits from handling and processing the increased production made possible by resource development, protection and use.

A third type of economic benefits are known as multiplier benefits. Increased employment or profits enables the recipient to purchase additional goods and services, thus increasing business activity in the immediate or surrounding communities. A fourth type of benefit includes pollution control, environmental improvement including beautification, improved water quality, recreation and improved fish and wildlife resources.

The ultimate economic impact of an RC&D project upon an area is conditioned by many factors. Some of these are the availability, quality, and degree of development of the physical resources of the area; population characteristics including numbers or density, age class, education and skills; the accessibility and transportation facilities; location of the projects in relation to growth centers; and the general economic condition of the state and nation.

The Beartooth project area has a low population density that has declined for more than 40 years. In 1960, the census reported 13,843 people and for 1970 the census shows 11,502. This continual out-migration has had a serious economic impact on the area. The present economy is almost wholly based on agricultural - grain, hay and beef production. The project area has a tremendous potential for recreation, both summer and winter, most of which is undeveloped. It has the second richest mineral deposit in Montana, which is largely underdeveloped. Based on the above conditions and the general unsettled economic situation which now prevails, project development will proceed rather slowly during the next three-year period. This will be the period in which opportunities are more fully assessed and funds become available for construction. It is further anticipated that wide-spread development will be undertaken during the four to eight-year period. This will continue at an accelerated rate during the nine to twenty-year period. These assumptions are based upon stabilization of the nation's economic

conditions with continued growth and expansion during the twenty-year development period. The economic impact on the project area is based upon the above assumptions and our best estimates and are as follows:

<u>Period of Time</u>	<u>Construction Investments</u>	<u>Man-years Employment</u> ^{1/}	<u>Economic Impact</u>
0-3 yrs.	\$ 10,305,240	515	\$ 25,763,100
4-8 yrs.	\$ 17,175,400	1,431	\$ 42,938,500
9-20 yrs.	<u>\$ 41,220,960</u>	<u>4,122</u>	<u>\$103,052,400</u>
TOTAL	\$ 68,701,600	6,068	\$171,754,000

^{1/} Man-years of employment include technical assistance, construction, annual operation and maintenance.

SECTION VI

PROJECT INSTALLATION

The land treatment measures are an integral part of this project program and interdependent with structural measures. Land treatment measures will be installed concurrent with structural measures to assure planned benefits.

The Program Committee will continue to coordinate the Beartooth Resource Conservation and Development Project program. Work will be with the Project Coordinator in (1) reviewing and establishing priorities on all applications; (2) assisting in development of annual budgets; (3) helping prepare annual operational plan; (4) working with project sponsors in implementing works of improvement; and (5) promoting project objectives at every opportunity.

SECTION VII

PROVISIONS for OPERATION and MAINTENANCE

Annual operation and maintenance and replacement costs for all works of improvement will be in accordance with the Agreements of Operation and Maintenance for each individual project.

Operation and maintenance costs will be borne by the individual project sponsors either through taxation, appropriations, or assessments against the persons benefited.

The works of improvement will be agreed upon by the districts and the Soil Conservation Service before installation and will be maintained after installation in the best interests of all concerned.

